Аппаратная экосистема QNX: поддерживаемые процессорные платы и стартовые комплекты SWD TimeMaster

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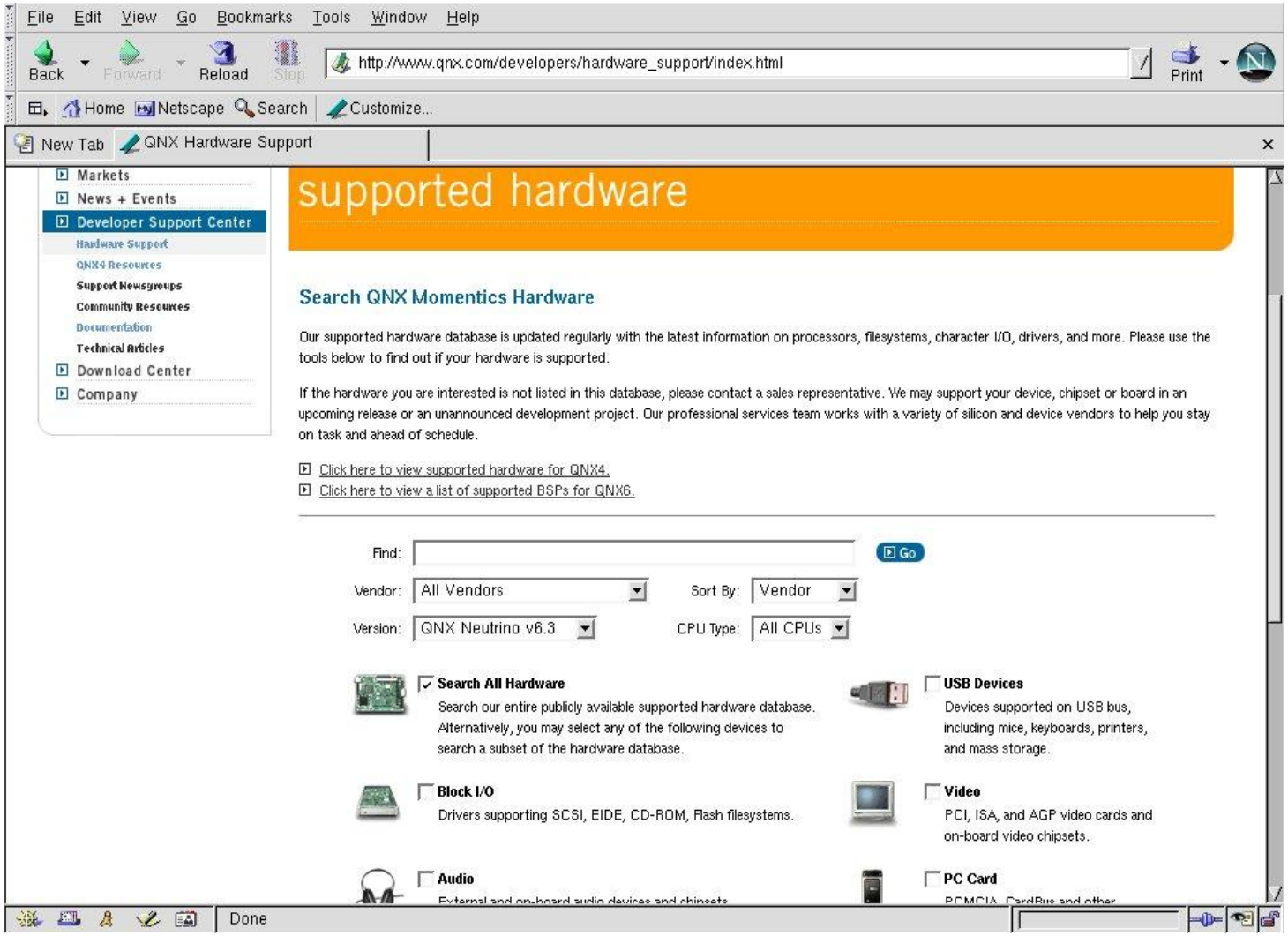
QNX поддерживает широкий спектр современного оборудования

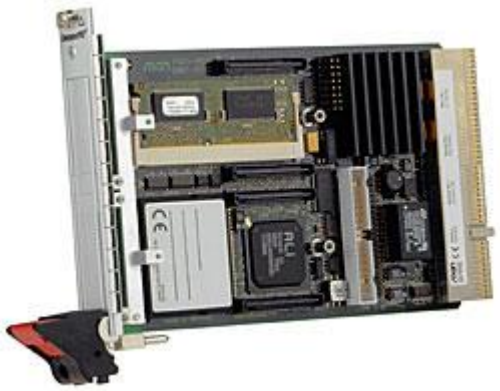
Стандартные драйвера:

- Блочных устройств, devb-……
- Сетевые, devn-……
- Видео, devg-……
- Аудио, deva-ctrl-……
- Символьных устройств, devc-……
- Устройств ввода, devi-……
- PCMCIA/CardBus, devp-……
- USB, devu-……

Поддерживаемое оборудование



Board Support Packages, BSPs

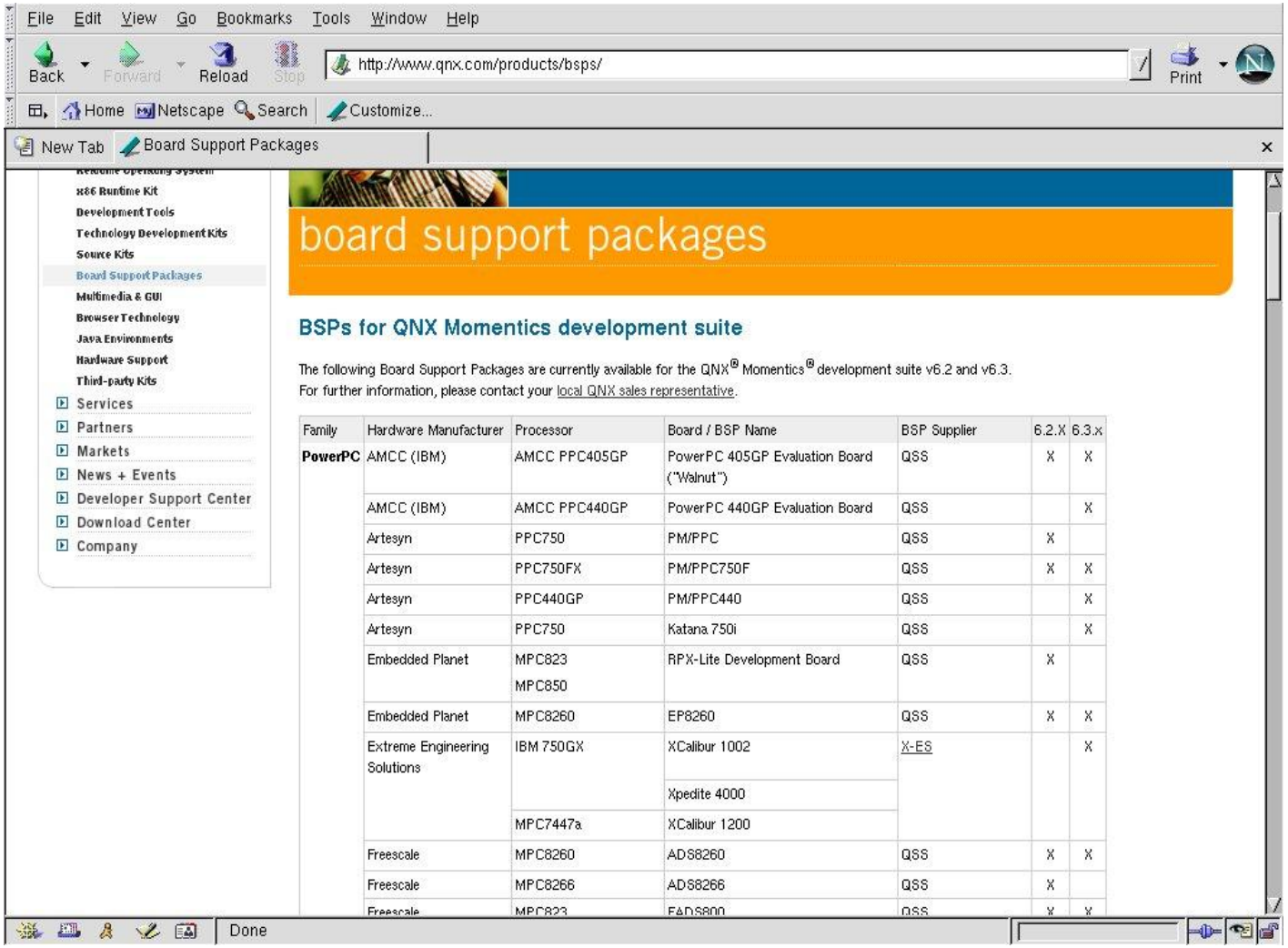


QNX Neutrino

Board Support Package

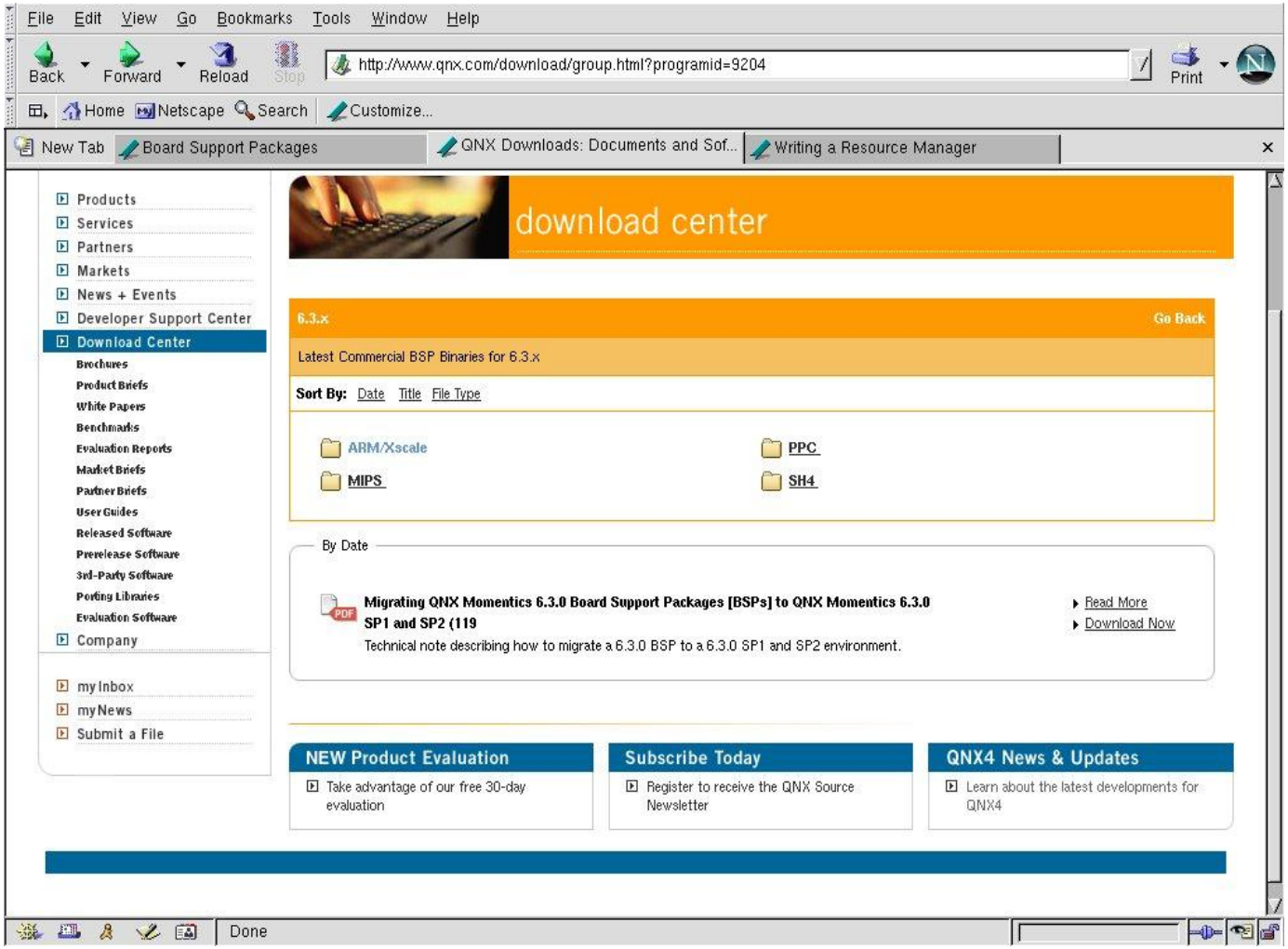
- Документация
- Примеры реализации
- System Builder (IDE)
- Исходные тексты для startup-кода и драйверов интегрированных устройств
- Исполняемые файлы для поддерживаемых процессорных плат

Board Support Packages, BSPs



Family	Hardware Manufacturer	Processor	Board / BSP Name	BSP Supplier	6.2.X	6.3.x
PowerPC	AMCC (IBM)	AMCC PPC405GP	PowerPC 405GP Evaluation Board ("Walnut")	QSS	X	X
	AMCC (IBM)	AMCC PPC440GP	PowerPC 440GP Evaluation Board	QSS		X
	Artesyn	PPC750	PM/PPC	QSS	X	
	Artesyn	PPC750FX	PM/PPC750F	QSS	X	X
	Artesyn	PPC440GP	PM/PPC440	QSS		X
	Artesyn	PPC750	Katana 750i	QSS		X
	Embedded Planet	MPC823 MPC850	RPX-Lite Development Board	QSS	X	
	Embedded Planet	MPC8260	EP8260	QSS	X	X
	Extreme Engineering Solutions	IBM 750GX	XCalibur 1002	X-ES		X
			Xpedite 4000			
		MPC7447a	XCalibur 1200			
	Freescale	MPC8260	ADS8260	QSS	X	X
	Freescale	MPC8266	ADS8266	QSS	X	
	Freescale	MPC823	EADS800	QSS	X	X

Board Support Packages, BSPs



Driver Development Kits, DDKs

QNX Neutrino

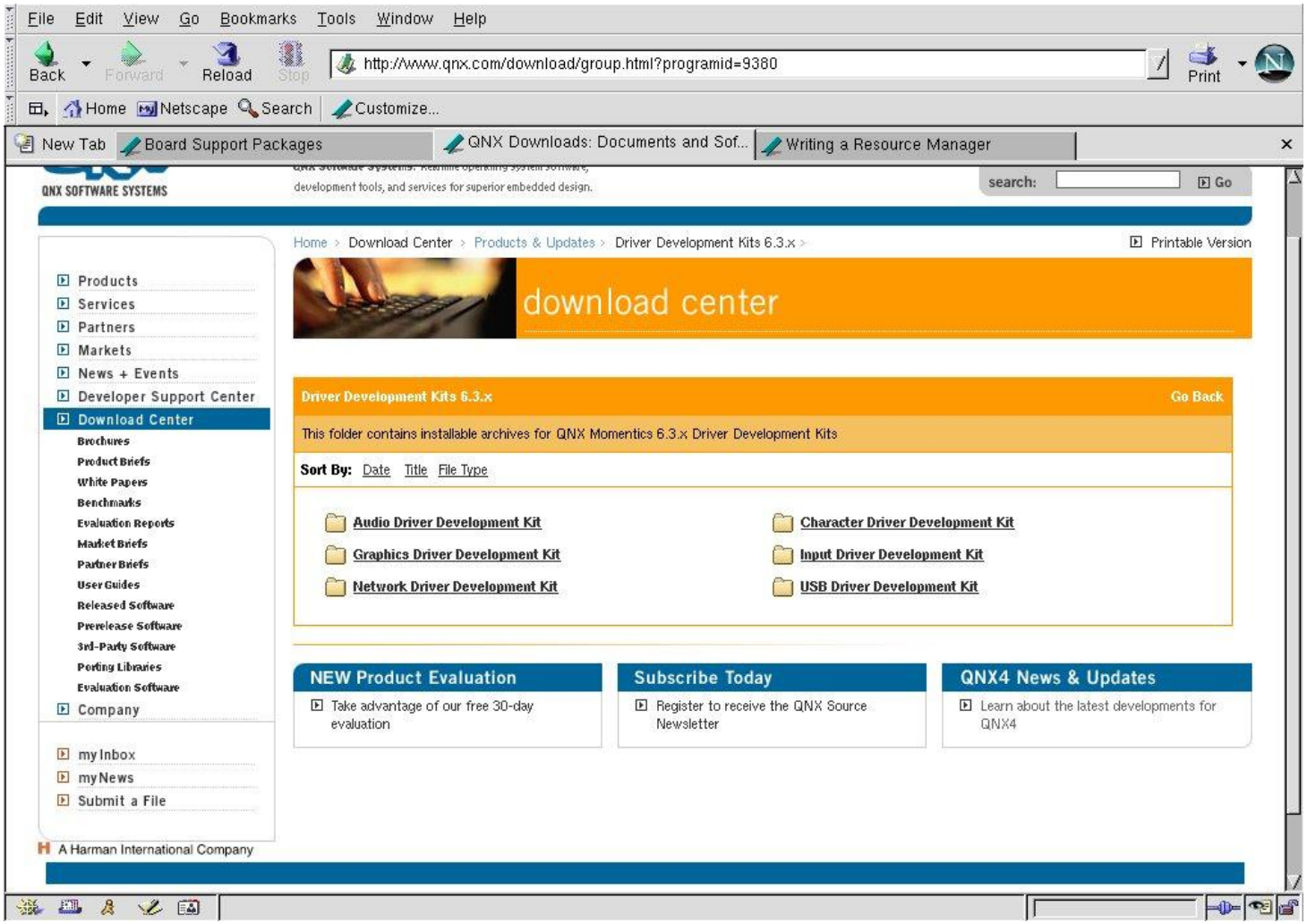
Driver Development Kit

- Документация
- Примеры с исходными текстами
- DDK Framework
- Аппаратно-независимый код вынесен в библиотеку
- Разрабатывается только специфичная для аппаратуры часть кода

Driver Development Kits, DDKs

- Audio DDK
- Char DDK
- Graphics DDK
- Input DDK
- Network DDK
- USB DDK

Driver Development Kits, DDKs



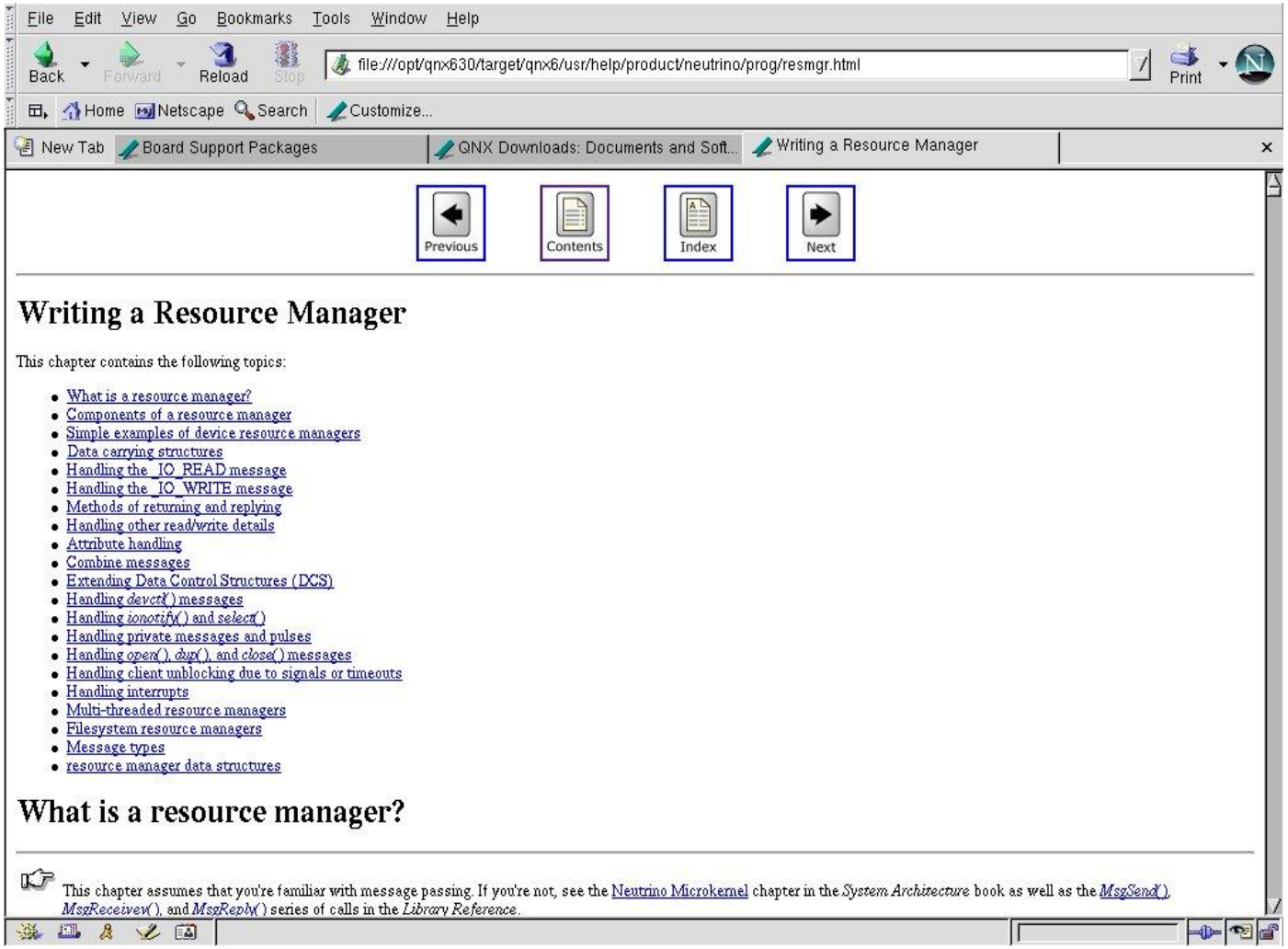
Ресурсный менеджер:

- Программа-сервер уровня пользователя
- Обслуживает определенный аппаратный или виртуальный ресурс
- Send/Receive/Reply

```
initialize the resource manager
register the name with the process manager
DO forever
    receive a message
    SWITCH on the type of message
        CASE _IO_CONNECT:
            call io_open handler
            ENDCASE
        CASE _IO_READ:
            call io_read handler
            ENDCASE
        CASE _IO_WRITE:
            call io_write handler
            ENDCASE
        .   /* etc. handle all other messages */
        .   /* that may occur, performing     */
        .   /* processing as appropriate      */
    ENDSWITCH
ENDDO
```

- POSIX API
- Стандартный интерфейс клиент - ресурсный менеджер
- Стандартные утилиты (ls, cat, …) могут работать с устройствами ресурсного менеджера

Resource Manager Framework



Дисковая подсистема

- EIDE (HDD, CDROM, CompactFlash) devb-eide
  - Intel
  - VIA
  - AMD
  - SiS
  - Cyrix
- SCSI (HDD, CDROM)
  - Adaptec devb-ahaX, X=2,4,7,8 devb-adpu320
  - AMD devb-amd
  - BusLogic/Mylex devb-btmm
  - NCR/Symbios devb-ncr8
- RAID, OS-independent
  - http://www.infortrend.com
  - http://www.accusys.com.tw
  - http://www.promise.com

Сетевые адаптеры

- Ethernet, 10/100/1000 Mbit/s
  - UTP (various)
  - Wireless (802.11b/g – Orinoco, Prism, Broadcom)
  - Fiber Optic (Corman Technologies Inc.)

- Наиболее популярные чипсеты:
  - RTL-8139A/B/C devn-rtl
  - Intel 8255x/82562 devn-speedo
  - Intel 8254x devn-i82544
  - Broadcom 570x devn-tigon3
  - 3COM, семейство чипов 3C905 devn-el900
  - VIA Tech. VT86C100/A devn-via-rhine

Видеоадаптеры

- Наиболее популярные адаптеры
  - ATI (Radeon xxxx) devg-radeon
  - Intel (i830/845/855/865) devg-i830
  - nVidia (TNT, TNT2, GeForce2/4) devg-tnt
  - Matrox (G400/G450/G550) devg-matroxg
  - C&T (CT6555x, CT690xx) devg-chips
- Multimonitor placement (ATI Radeon, Matrox G450/550)
- devg-vesabios
- devg-vesatweak
  - http://projects.qnxzone.com/project/showfiles.php?group_id=7

Адаптеры последовательных устройств

- Есть драйвера последовательных устройств для разных процессорных платформ
- Для 8250-compatible UART используется драйвер devc-ser8250
- Мультипортовые адаптеры
  - Connect Tech Inc. (BlueHeat/PCI, BlueHeat/Net, Xtreme/104)
  - Moxa Technologies (ISA, PCI, PC/104)
  - Advantech (ISA, PCI, PC/104)
  - Sealevel Systems (ISA, PCI, PC/104, PCMCIA)
- Character DDK

USB-устройства

- Контроллеры
  - UHCI (USB 1.1) devu-uhci
  - OHCI (USB 1.1) devu-ohci
  - EHCI (USB 2.0) devu-ehci
- Поддерживаемые классы устройств USB
  - USB Mouse devu-mouse
  - USB Keyboard devu-kbd
  - USB Printer devu-prn
  - USB Network devn-xxxx
  - USB Mass Storage devb-umass
- USB DDK

Фреймграбберы

- Популярные и недорогие
  - Conexant/BrookTree BT848/878/879

    http://ai.pjwstk.edu.pl/~newchief/qnx/btlib

    http://argo.lira.dist.unige.it/cbeltran/welcome.htm

- High Performance
  - ARVOO Products, Picasso framegrabbers (monochrome, color, digital)

    http://www.arvoo.com
  - Matrox Genesis Native Library (QNX 4, QNX 6)

Digital/Analog I/O

- United Electronic Industries
  - PowerDAQ SDK for QNX 4, QNX 6

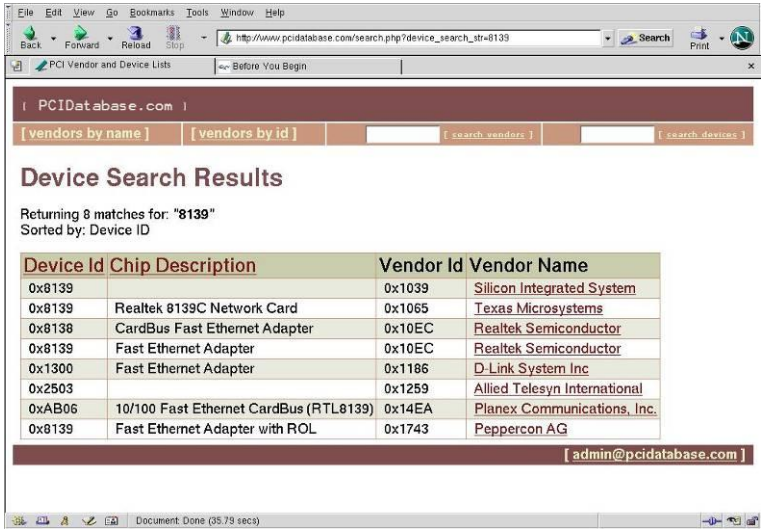
    http://www.ueidaq.com

    http://www.ueidaq.com/products/software/qnx/pd-qnx/
- Resource Manager Framework
- Заказная разработка
  - Подробная техническая документация
  - Техническое задание

Диагностика системы

- PCI-устройства
  - Утилита pci, ‘pci -vvv’
  - http://www.pcidatabase.com
  - http://pciids.sourceforge.net

```
Class          = Network (Ethernet)
Vendor ID      = 10ech, Realtek Semiconductor
Device ID      = 8139h, RT8139A/B/C Fast Ethernet Adapter
PCI index      = 0h
Class Codes    = 020000h
Revision ID    = 10h
Bus number     = 0
Device number  = 9
Function num   = 0
Status Reg     = 280h
Command Reg    = 7h
        I/O space access enabled
        Memory space access enabled
        Bus Master enabled
        Special Cycle operations ignored
        Memory Write and Invalidate disabled
        Palette Snooping disabled
        Parity Checking disabled
        Data/Address stepping disabled
        SERR# driver disabled
        Fast back-to-back transactions to different agents disabled
Header type    = 0h Single-function
BIST           = 0h Build-in-self-test not supported
Latency Timer  = 20h
```



Диагностика системы

- USB-устройства
  - Утилита pci, ‘pci -vvv’
  - Утилита usb

```
Class          = Serial Bus (Universal Serial Bus)
Vendor ID      = e11h, Compaq Computer Corp.
Device ID      = a0f8h,  USB Open Host Controller
PCI index      = 0h
Class Codes    = 0c0310h
Revision ID    = 6h
Bus number     = 0
Device number  = 19
Function num   = 0
Status Reg     = 280h
Command Reg    = 7h
        I/O space access enabled
        Memory space access enabled
        Bus Master enabled
        Special Cycle operations ignored
        Memory Write and Invalidate disabled
        Palette Snooping disabled
        Parity Checking disabled
        Data/Address stepping disabled
        SERR# driver disabled
        Fast back-to-back transactions to different agents disabled
Header type    = 0h Single-function
BIST           = 0h Build-in-self-test not supported
Latency Timer  = 20h
```

```
# usb
USB (OHCI) v1.10, v1.01 DDK

Device Address             : 1
Vendor                     : 0x067b (Prolific Technology Inc.)
Product                    : 0x0000
Class                      : 0x00 (Independant per interface)

# usb -v
USB (OHCI) v1.10, v1.01 DDK
    Control, Interrupt, Bulk, Isoch, Low speed, High speed

Device Address             : 1
Vendor                     : 0x067b (Prolific Technology Inc.)
Product                    : 0x0000
Device Release             : r0.00
Class                      : 0x00 (Independant per interface)
Max PacketSize0            : 8
Configurations             : 1
  Configuration            : 1
    Attributes             : 0xa0 (Bus-powered, Remote-wakeup)
    Max Power              : 100 mA

#
```

Диагностика системы

- Утилита pidin
- Утилита spin

```
[root@qnx include]# pidin info
CPU:X86 Processors:1 FreeMem:44Mb/79Mb BootTime:Nov 17 11:30:31 UTC 2003
Processor1: 686 Pentium Pro Stepping 9 199MHz FPU
[root@qnx include]# pidin net
 ND     Node              CPU Processors   FreeMem       BootTime
 0      qnx               X86      1       44Mb/79Mb     Nov 17 11:30:31 UTC 2003
[root@qnx include]# pidin irqs
     pid tid name
       1   1 6/boot/sys/procnto
               0        0x80000000     0 —— @0xf0027c82:0x0
               1                 0     0 —— @0xf002772b:0x0
       1   2 6/boot/sys/procnto
       1   3 6/boot/sys/procnto
       1   4 6/boot/sys/procnto
       1   5 6/boot/sys/procnto
       1   6 6/boot/sys/procnto
       1   7 6/boot/sys/procnto
       1   8 6/boot/sys/procnto
       1   9 6/boot/sys/procnto
       1  10 6/boot/sys/procnto
       1  11 6/boot/sys/procnto
       1  12 6/boot/sys/procnto
       1  13 6/boot/sys/procnto
       1  14 6/boot/sys/procnto
       2   1 sbin/tinit
       3   1 proc/boot/slogger
   12292   1 sbin/mqueue
       5   1 proc/boot/pci-bios
       6   1 roc/boot/devb-eide
       6   2 roc/boot/devb-eide
               2             0xe     0 TP- =PULSE 0x40000002:21 0x2:0
       6   3 roc/boot/devb-eide
               3             0xf     0 TP- =PULSE 0x40000005:21 0x2:0
       6   4 roc/boot/devb-eide
       6   5 roc/boot/devb-eide
       6   6 roc/boot/devb-eide
       6   7 roc/boot/devb-eide
       6   8 roc/boot/devb-eide
       7   1 roc/boot/devb-aha4
               4             0xb     0 TP- =PULSE 0x40000002:21 0x2:0xb8207a62
```

```
total 34
      4 ./                                          1 pccard-types
      8 ../                                         1 pccard-vendors
      1 audio                                       4 pci-class
      1 block                                       3 pci-vendors
      4 isa-types                                   5 pnpbios-types
      1 net
      1 par-class
[root@qnx include]# pidin -p io-net mem
     pid tid name               prio STATE            code  data        stack
   77843   1 sbin/io-net         10o SIGWAITINFO       60K  604K  8192(516K)*
   77843   2 sbin/io-net          9o RECEIVE           60K  604K   4096(68K)
   77843   3 sbin/io-net         10o RECEIVE           60K  604K   4096(68K)
   77843   4 sbin/io-net         10o RECEIVE           60K  604K   4096(68K)
   77843   5 sbin/io-net         10o RECEIVE           60K  604K   4096(68K)
   77843   6 sbin/io-net         10o RECEIVE           60K  604K  4096(132K)
   77843   7 sbin/io-net         21r RECEIVE           60K  604K  4096(132K)
   77843   8 sbin/io-net         10o RECEIVE           60K  604K  4096(132K)
   77843  10 sbin/io-net         21r CONDVAR           60K  604K  4096(132K)
             ldqnx.so.2        @b0300000              312K   16K
             npm-tcpip.so      @b8200000              236K   56K
             devn-rtl.so       @b8249000               48K  4096
             npm-qnet.so       @b8256000              136K  8192
[root@qnx include]#
```

```
 Load Avr:   13.61%            [ qnx:x86pc ]          Time: 11/17/03 12:30:11 UTC
 Mem free:   56.39% [R: 44m/79m S:      N/A]        Uptime: 00/00/00 00:59:40
 Net  en0:    0.00% [Tx:  207 b/s Rx:   66 b/s]      Cycle: 1000 msec

 No         PID Name/TID         Prio  #Thr   CPU% ThrCPU%  Memory  #FD ThreadIP

  1           1 procnto                 10   98.39           4450k   31
                   1       READY   0f                99.80               f000efb0
                   4     RUNNING   9r                 0.10               f000efb2
  2     1024011 spin                     1    1.50            112k   10
  3       77843 io-net                   9    0.10            816k    6
  4           9 fs-pkg                   6    0.10           1540k    3
  5       45068 devc-pty                 1    0.00            140k    3
  6      737307 rlogind                  1    0.00             80k    6
  7           6 devb-eide                8    0.00             12m    6
  8      139282 random                   3    0.00            388k    3
  9           2 tinit                    1    0.00             44k    0
 10           3 slogger                  1    0.00             84k    3
 11           5 pci-bios                 1    0.00             36k    3
 12           7 devb-aha4                6    0.00             10m    5

 27                                     74                     34m  138

  Mode: [C]pu-[r]am-[e]lf  Order: [n]ame-cp[U]-[m]emory-[h]eap-[f]ds  More: /
```

Диагностика системы

- Утилита nicinfo
- Утилита pin
- Утилита sloginfo

```
# pin config
; socket 2
[device]
manufacturer = "3Com Corporation"
product = "3C589D"
info1 = "TP/BNC LAN Card Ver. 2a"
info2 = "000002"
regbase = 0x10000
config = 0x01, 0x0600, irq any, io any+16 (width=16)
config = 0x03, 0x0600, irq any, io any+16 (width=16)
register = 0, 0x40, 0x40     ; level mode interrupts
# pin cis
Socket    : 2 - Function    : 0
Device                    : Null
Attribute Device          : EEPROM 8k
Manufacturer ID           : 0x101  0x589
PC Card function          : Network LAN Adapter
POST                      : 0x0
Card tuple version        : 4.01
Manufacturer              : 3Com Corporation
Name of Product           : 3C589D
Add'nl info (lot #)       : TP/BNC LAN Card Ver. 2a
Add'nl info (programming): 000002
Configuration base/st     : 0x10000  0-subtuples
Configuration Index       : 0x1 Default
Interface                 :  I/O
Feature                   :  0x1d
Timing Info               :  Wait Busy
IO Space                  :  Bus16 Bus8 0x0-0xF(4 lines)
IRQ Description           :  Level 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Configuration Index       : 0x3 Last
Feature                   :  0x1
Attribute memory JEDEC    : 0x0000
Checksum addr, len, val   : 0xff88 129 0x00
# pin
Sock  Func Type    Flags            PID    Base          Size  IRQ
1          Empty   ----MF---------- None
1          Empty   ----MF---------- None
2     0    Network C---I-+---X----- 73741  0x200          16   7
2          Empty   ----MF---------- None
# 
```

```
[ivm@qnx ivm]$ /usr/sbin/nicinfo

RealTek 8139 Ethernet Controller
  Physical Node ID ................. 00E04C E9B8B7
  Current Physical Node ID ........ 00E04C E9B8B7
  Media Rate ....................... 100.00 Mb/s full-duplex UTP
  MTU .............................. 1514
  Lan .............................. 0
  I/O Port Range ................... 0xE000 -> 0xE0FF
  Hardware Interrupt ............... 0x9
  Promiscuous ...................... Disabled
  Multicast ........................ Enabled

  Total Packets Txd OK ............. 1554
  Total Packets Txd Bad ............ 0
  Total Packets Rxd OK ............. 2489
  Total Rx Errors .................. 0

  Total Bytes Txd .................. 221016
  Total Bytes Rxd .................. 200541

  Tx Collision Errors .............. 0
  Tx Collisions Errors (aborted) ... 0
  Carrier Sense Lost on Tx ......... 0
```

```
[ivm@qnx ivm]$ sloginfo
Time            Sev Major Minor Args
Nov 17 11:30:32    2    19     0 eide_identify_devices: Intel 82371SB vid 8086,
did 7010, class 10180 rev 0, busno 0, dfunc 9
Nov 17 11:30:32    2    19     0 eide_identify_devices: cmd_addr 1f0, cntl_addr
3f4, irq e, chnl 0, udma -1, mdma 2, sdma 0, pio 4
Nov 17 11:30:32    2    19     0 eide_display_devices: QUANTUM FIREBALL tid 0, c
able 40, max udma 0, cur udma 2, max mdma 2, cur mdma 2, max sdma 0, cur sdma 2,
 pio 4, mblk 16
Nov 17 11:30:32    2    19     0 eide_identify_devices: Intel 82371SB vid 8086,
did 7010, class 10180 rev 0, busno 0, dfunc 9
Nov 17 11:30:32    2    19     0 eide_identify_devices: cmd_addr 170, cntl_addr
374, irq f, chnl 1, udma -1, mdma 2, sdma 0, pio 4
Nov 17 11:30:32    2    19     0 eide_display_devices: CRD-8482B        tid 0, c
able 40, max udma -1, cur udma -1, max mdma 2, cur mdma 2, max sdma 0, cur sdma
2, pio 4, mblk 0
Nov 17 11:30:32    2    19     0 eide_init_devices: QUANTUM FIREBALL path 0, tid
 0, udma -1, mdma 2, sdma 0, pio 4, mblk 16
Nov 17 11:30:32    2    19     0 eide_init_devices: CRD-8482B        path 1, tid
 0, udma -1, mdma 2, sdma 0, pio 4, mblk 0
Nov 17 11:30:32    2     5     0 scsi_interpret_sense:  path=0, target=0, lun=0,
 cam_status=c4, scsi_status=2
Nov 17 11:30:32    2     5     0 scsi_interpret_sense:  error=70, sense=5, asc=2
4, ascq=0
```

Инициатива SWD TimeMaster

✔ Сокращение сроков разработки проекта

- все необходимое в одной коробке
- ОС QNX уже предустановлена

...и на русском

Поддерживаемые процессорные платы:

✔ Fastwel CPU686
✔ Fastwel CPU686E
✔ Lippert CoolFox II
✔ Diamond Systems Prometheus
✔ Ampro CoreModule 4xx
✔ Intel IXDP425
✔ Intel IXDP2800
✔ Kontron X-Board PXA255

✔ Доступны через SW... ...и
дилерскую сеть ком...

- есть 30-дневная ...рсия
- бесплатная техническая поддержка, в т.ч. для демо-версий

SWD – разработки, обучение

- Заказные разработки

- Обучение - “Разработка драйверов для ОСРВ QNX Neutrino”, “Разработка программного обеспечения реального времени для ОС QNX 4.25”

Спасибо!

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