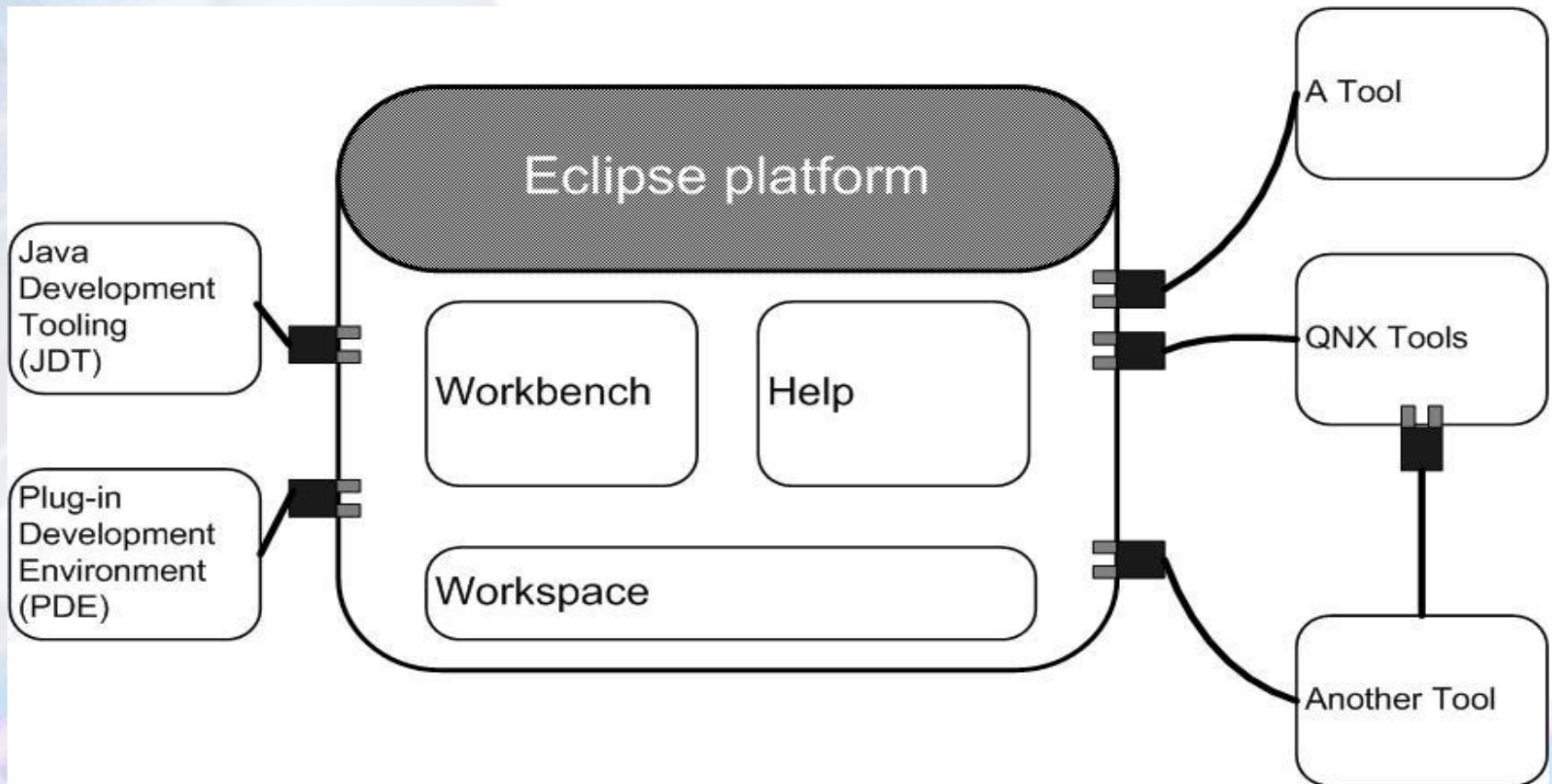


IDE QNX – практическая работа

Трофимов Александр
SWD Software

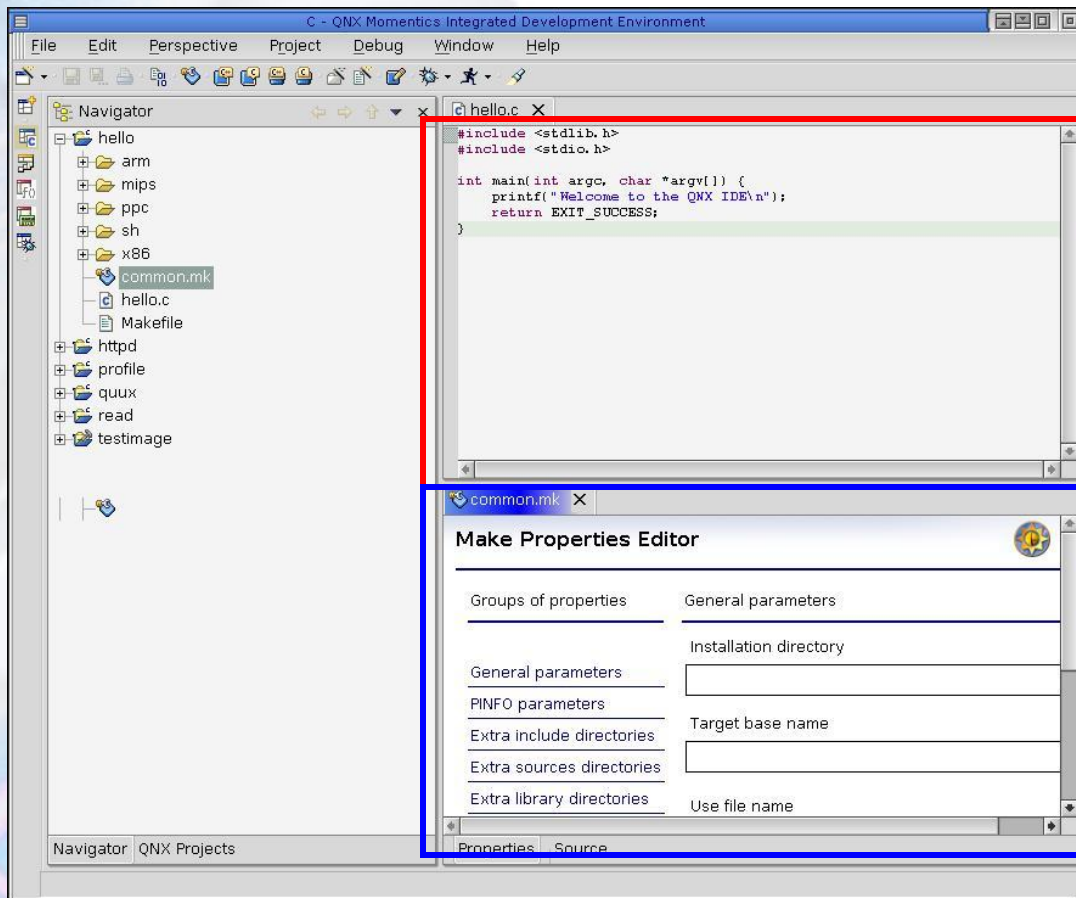
Архитектура Eclipse



- Организация ресурсов (проекты, папки, файлы)
- Редактирование ресурсов
- Организация работы над проектами в команде
- Компиляция, запуск и отладка программ
- Наблюдение и анализ работы системы
- Построение загрузочных образов для встраиваемых систем

- *perspectives* – зависящий от конкретной задачи набор *view*'ов и *editor*'ов.
- *views* – специальный инструмент для просмотра и работы над ресурсами, обеспечивающий организацию информации и навигацию по ней, а также некоторую поддержку для *editor*'ов.
- *editors* - визуальные компоненты для редактирования и просмотра ресурсов (например, файл с исходным C++ кодом).

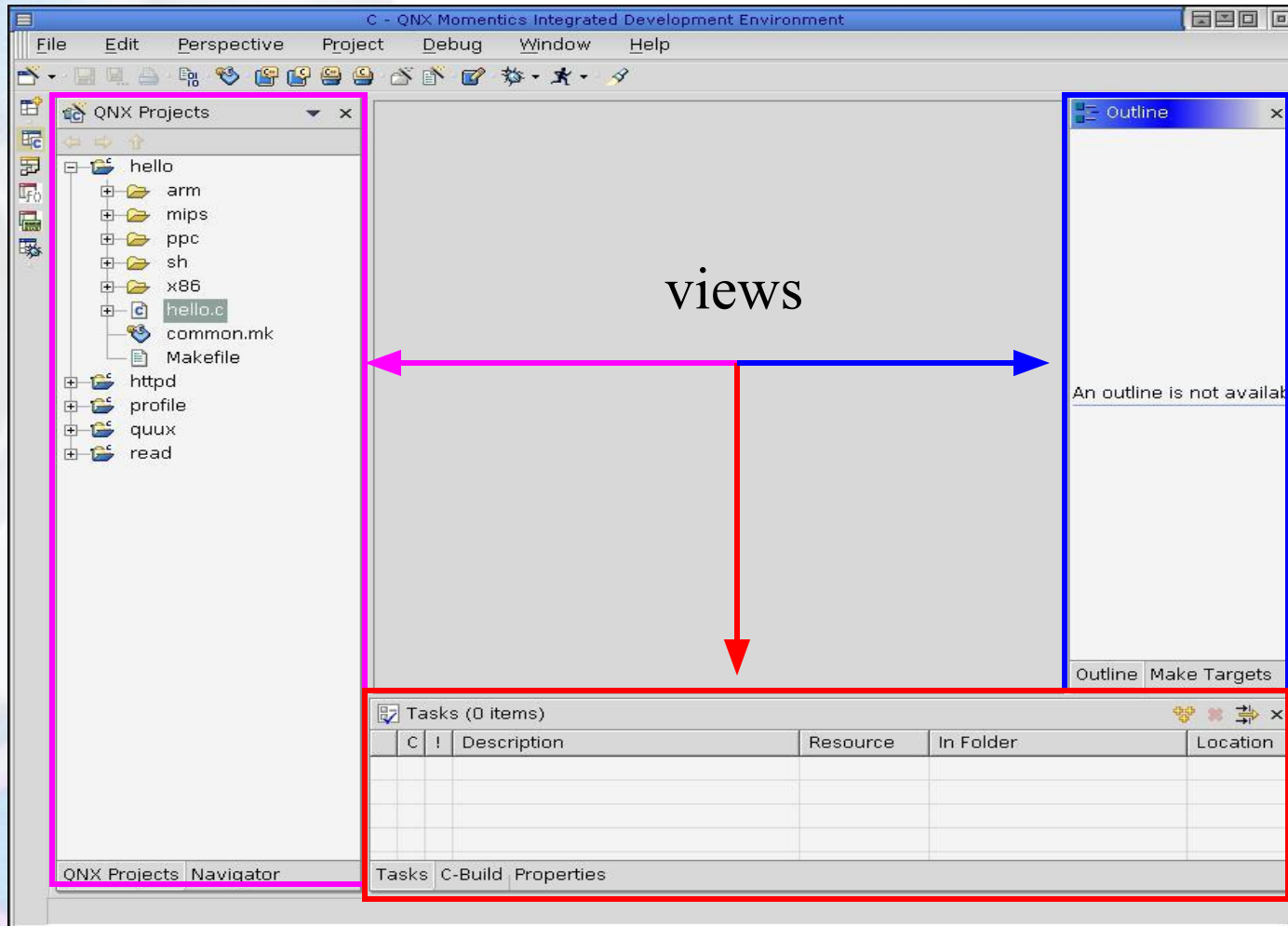
Пример editor



C editor

Make Properties
Editor

Пример view



Резидентная среда разработки:

QNX Momentics IDE

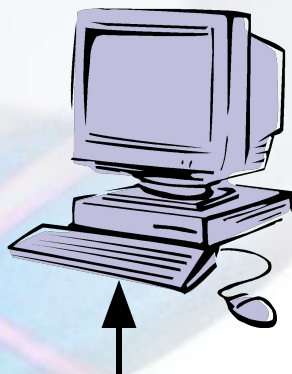


PC под управлением
QNX Neutrino

*Процесс, который вы
запускаете, отлаживаете,
профилируете*

Кросс разработка:

Инструментальная система под
управлением Windows/Solaris/Neutrino



QNX Momentics IDE

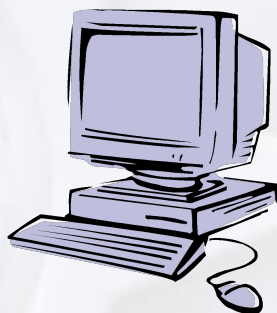
Целевая система под управлением
QNX Neutrino



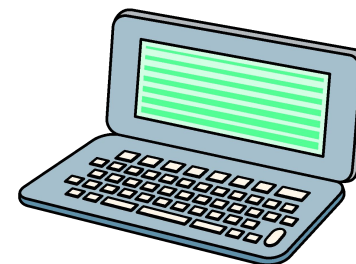
*Процесс, который вы
запускаете, отлаживаете,
профилируете*

транспорт

Инструментальная система с IDE



Целевая система под управлением QNX Neutrino



TCP/IP

Ethernet

- io-net
- devc-pty
- qconn
- pdebug
- *ваша_программа*

Что может быть целевой системой



- ARM/Xscale
- MIPS
- PowerPC
- SH-4
- x86

Настройка целевой системы в IDE

New QNX Target System

Target Name:

Use default location

Location:

QNX Connector Selection

Use local QNX Connector

Hostname or IP: Port:

Target Configuration

QNX Connector is on the target machine:

Hostname:

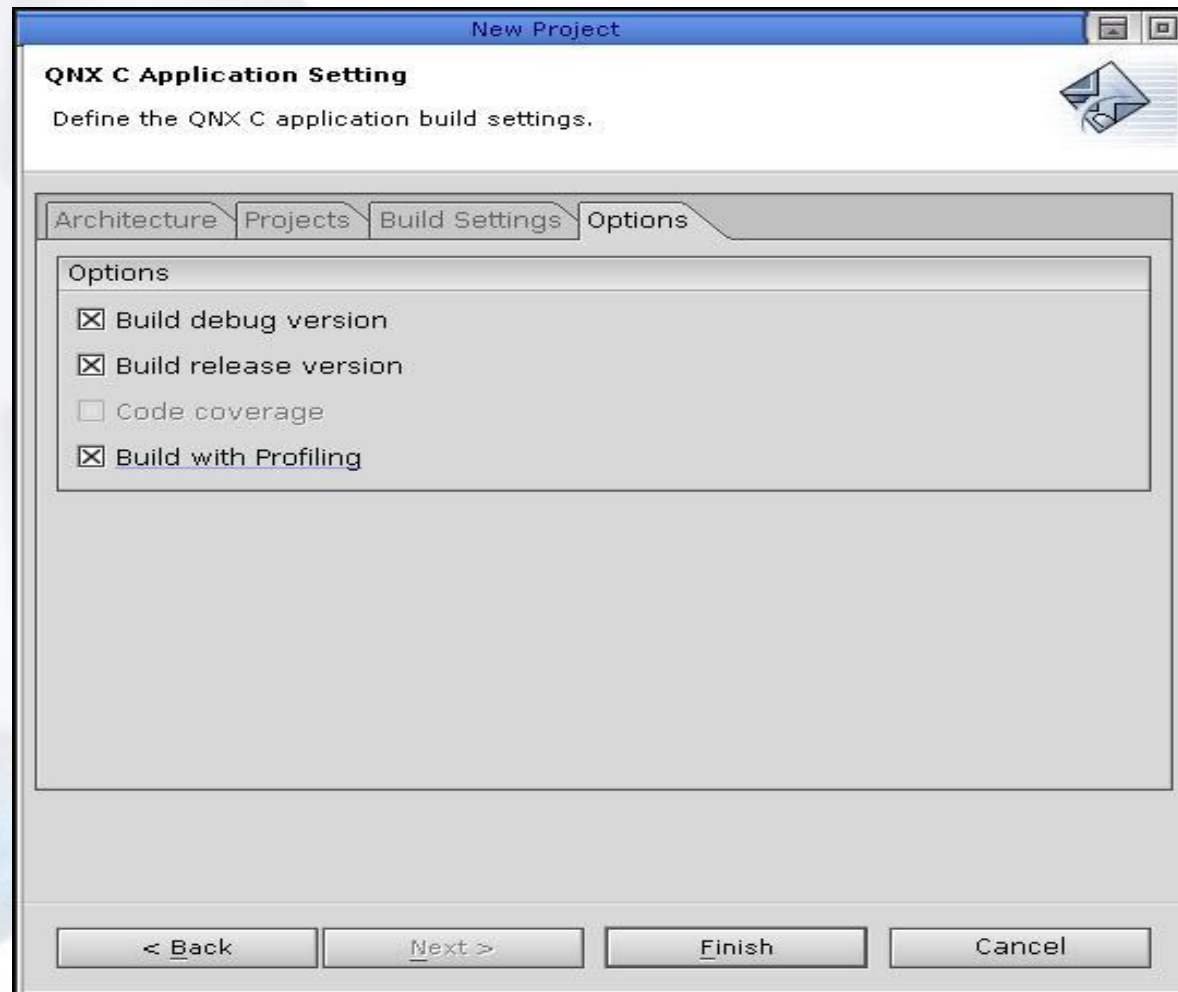
< Back Next > Finish Cancel

Что такое проект?

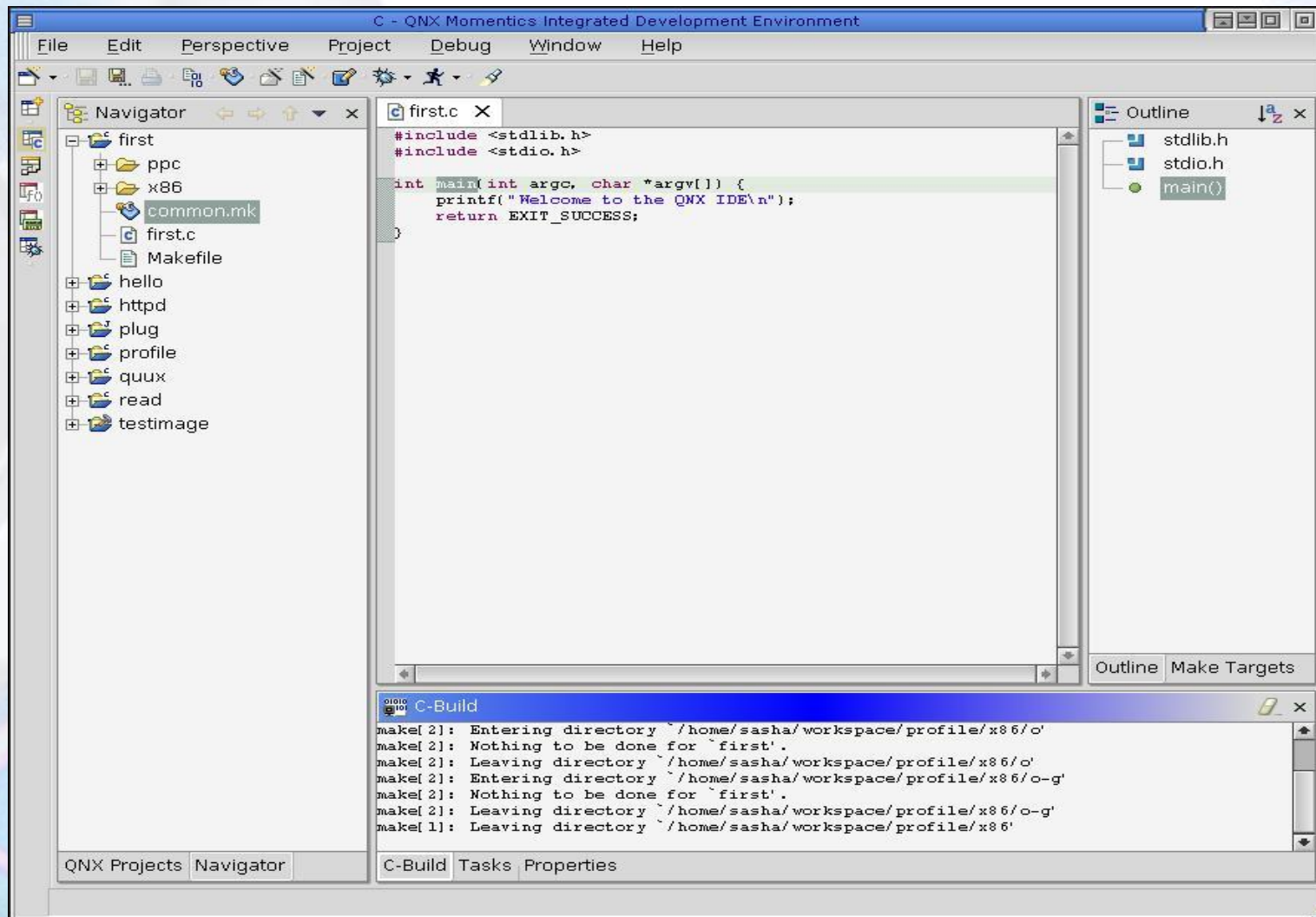
В IDE проект – это набор связанных ресурсов (например, каталогов или файлов) для управления вашими программами.

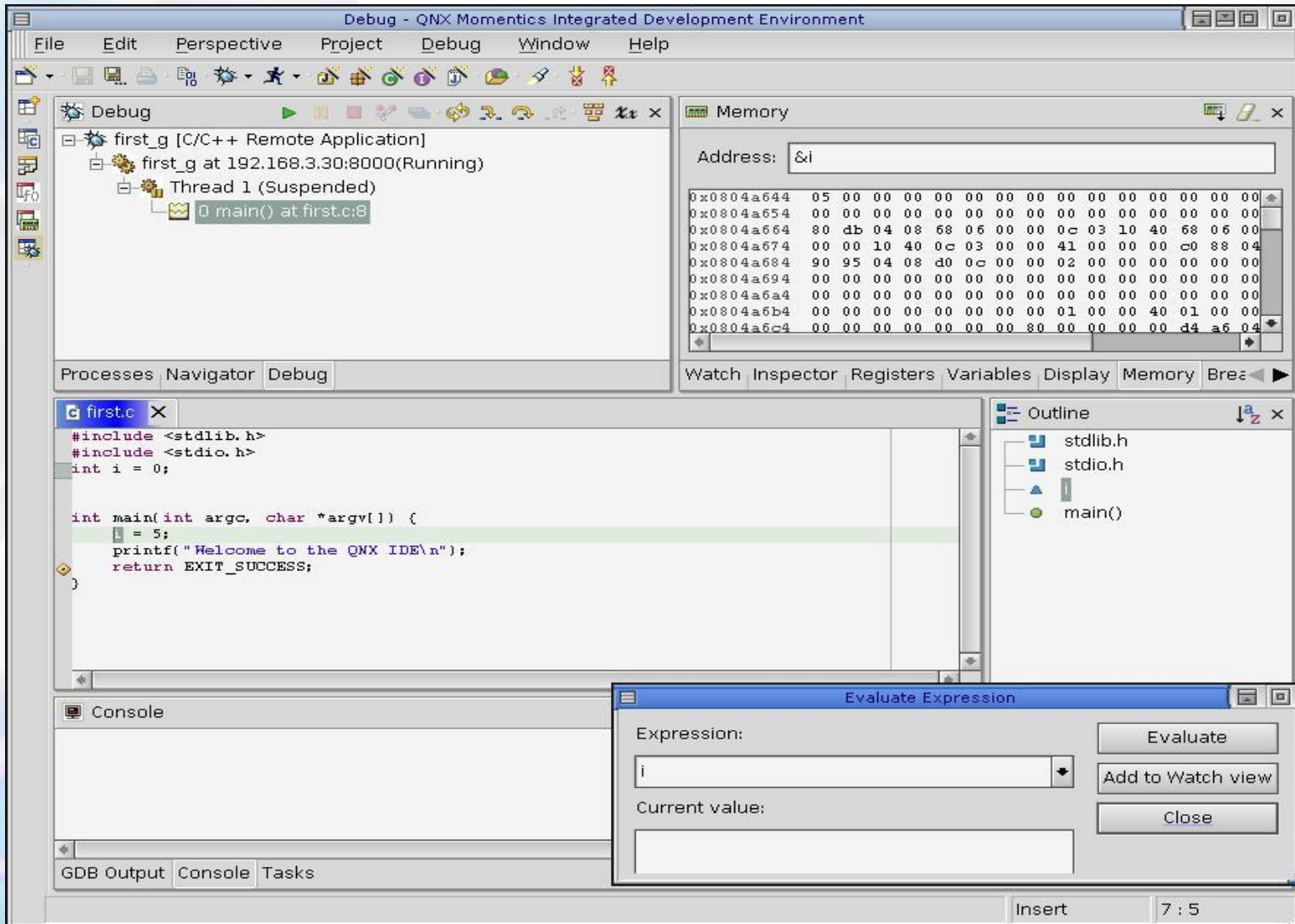
Большинство того, что делается в IDE – проектно-ориентированно – построение проектов, контроль версий, совместная работа над проектами.

Создание QNX C/C++ проекта



C Perspective





Debug - QNX Momentics Integrated Development Environment

File Edit Perspective Project Debug Window Help

Debug

- first_g [C/C++ Remote Application]
 - first_g at 192.168.3.30:8000(Running)
 - Thread 1 (Suspended)
 - 0 main() at first.c:8

Memory

Address: &i

0x0804a644	05 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0804a654	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0804a664	80 db 04 08 68 06 00 00 0c 03 10 40 68 06 00 00
0x0804a674	00 00 10 40 0c 03 00 00 41 00 00 00 c0 88 04
0x0804a684	90 95 04 08 d0 0c 00 00 02 00 00 00 00 00 00 00
0x0804a694	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0804a6a4	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0804a6b4	00 00 00 00 00 00 00 00 01 00 00 40 01 00 00 00
0x0804a6c4	00 00 00 00 00 00 00 00 80 00 00 00 00 d4 a6 04

Processes Navigator Debug

first.c

```
#include <stdlib.h>
#include <stdio.h>
int i = 0;

int main(int argc, char *argv[]) {
    i = 5;
    printf("Welcome to the QNX IDE\n");
    return EXIT_SUCCESS;
}
```

Outline

- stdlib.h
- stdio.h
- main()

Evaluate Expression

Expression: i

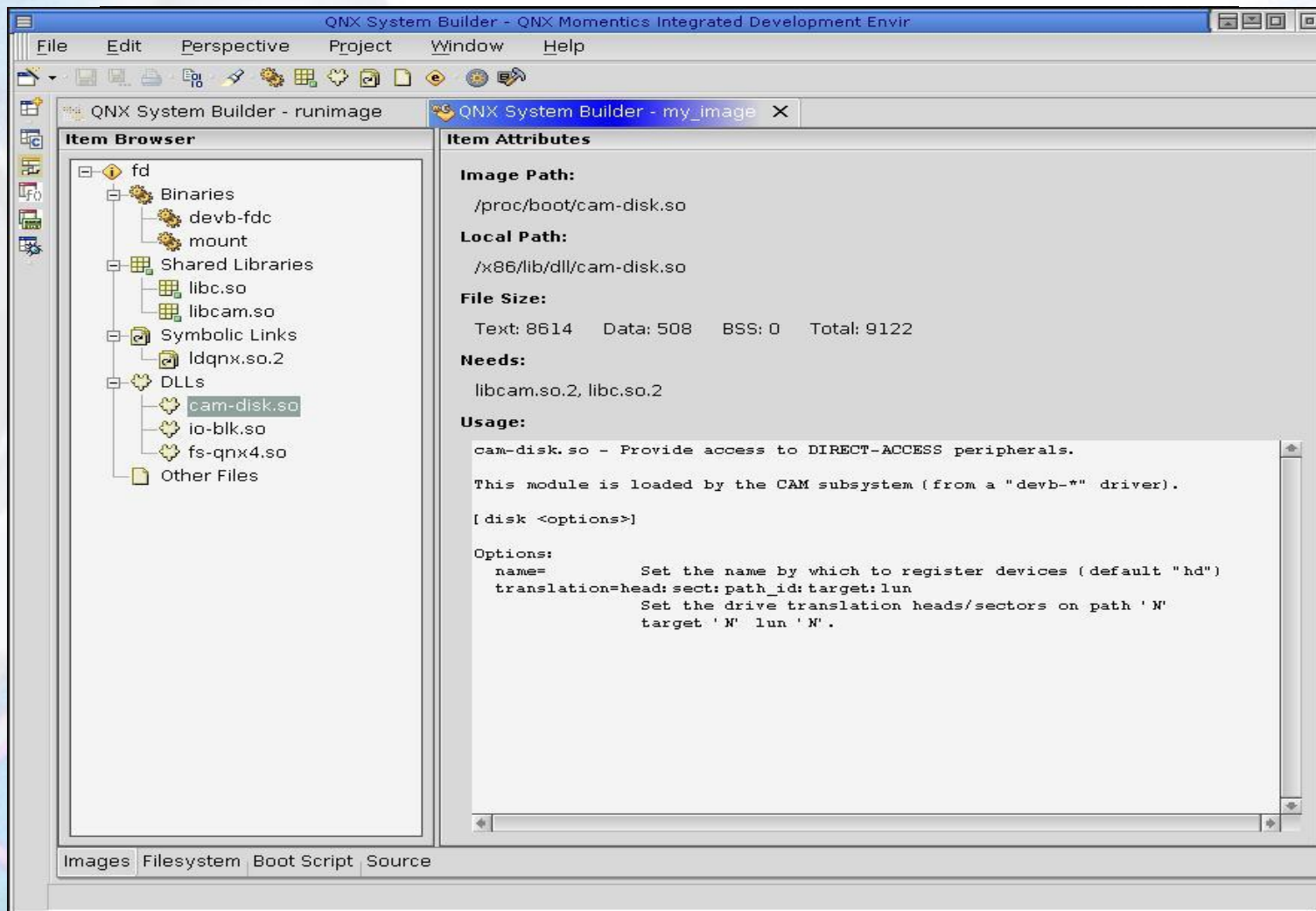
Current value: 5

Buttons: Evaluate, Add to Watch view, Close

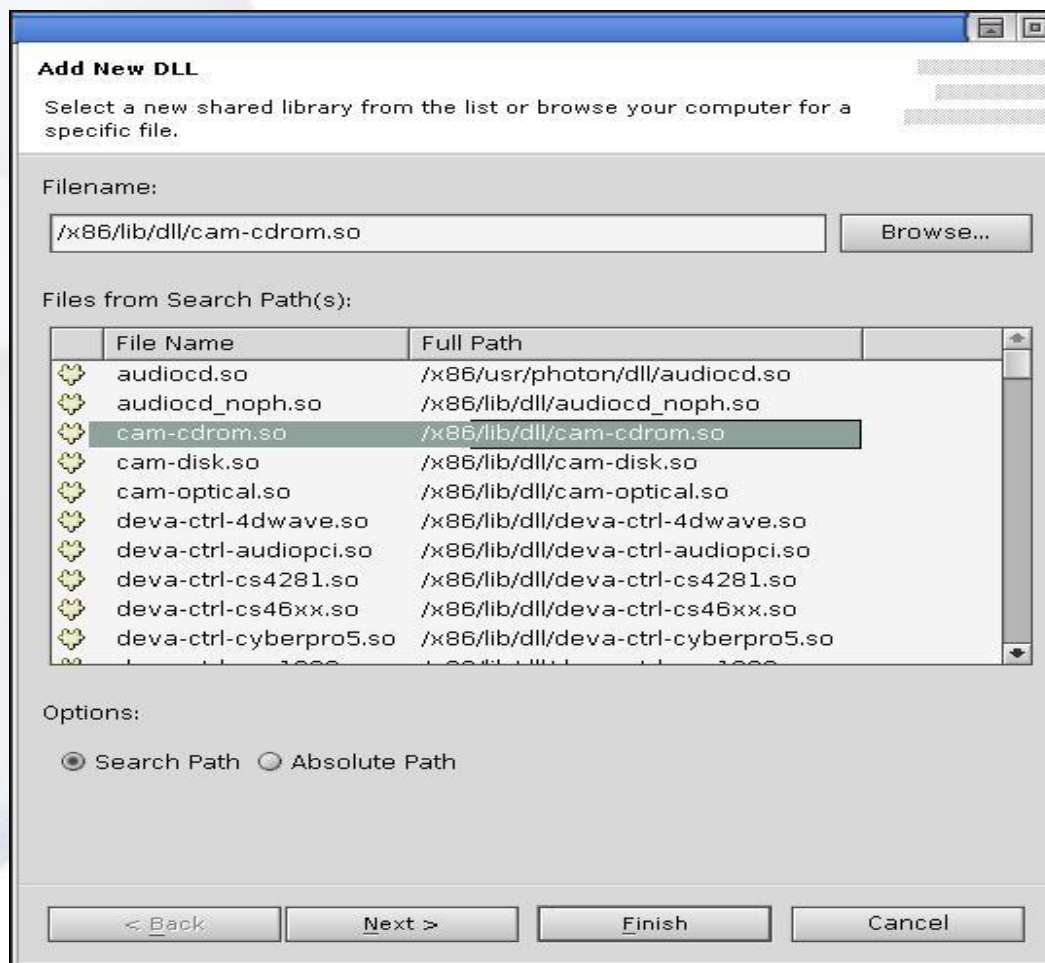
GDB Output Console Tasks

Insert 7 : 5

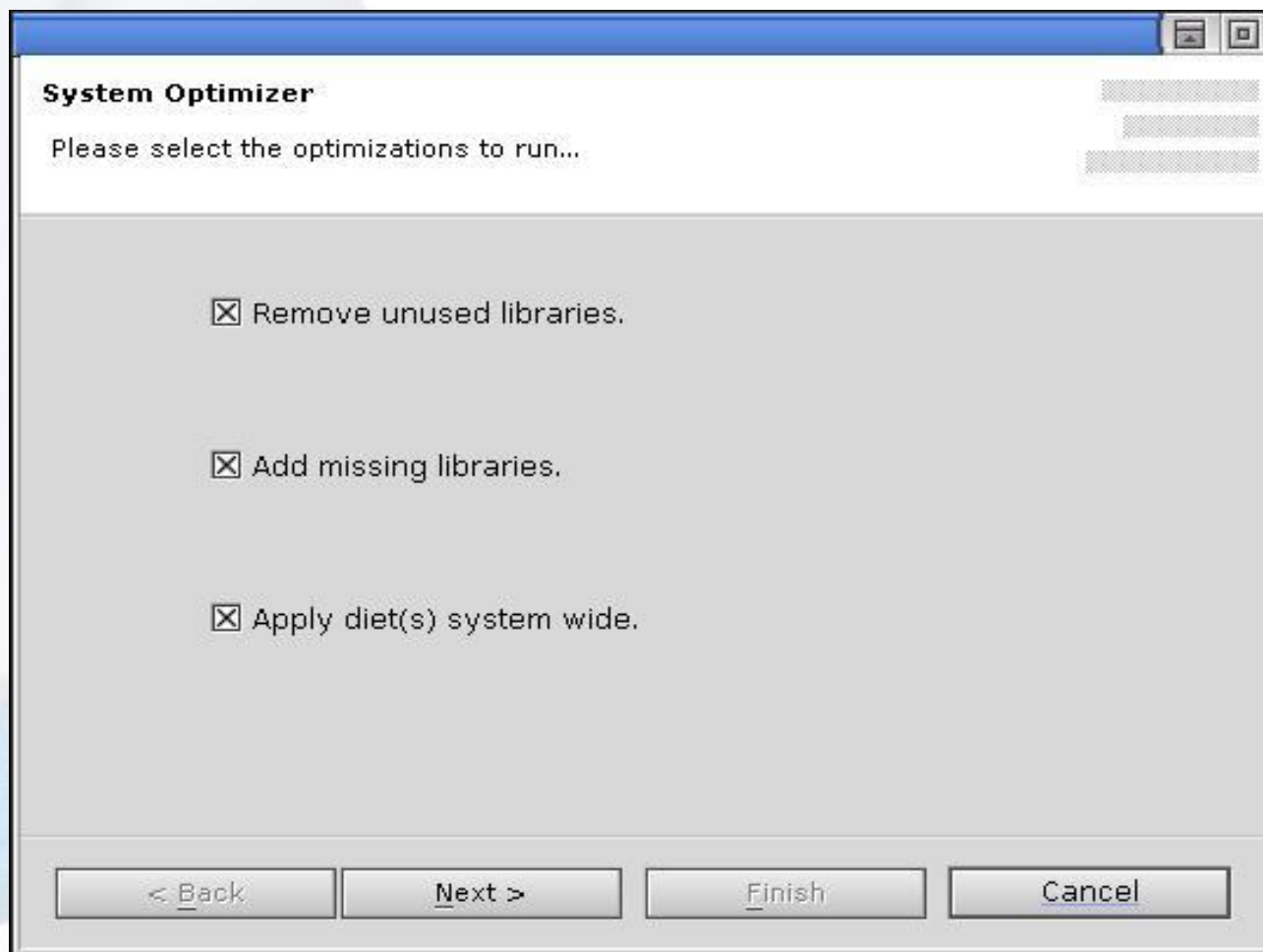
- Построение загрузочных образов системы
- Построение образов ПЗУ
- Оптимизация образа
- Разрешение зависимостей
- Взаимодействие с ROM monitor или QNX IPL на целевой машине для загрузки образа
- Содержит TFTP сервер для загрузки целевых машин, умеющих загружаться по сети с использованием TFTP протокола



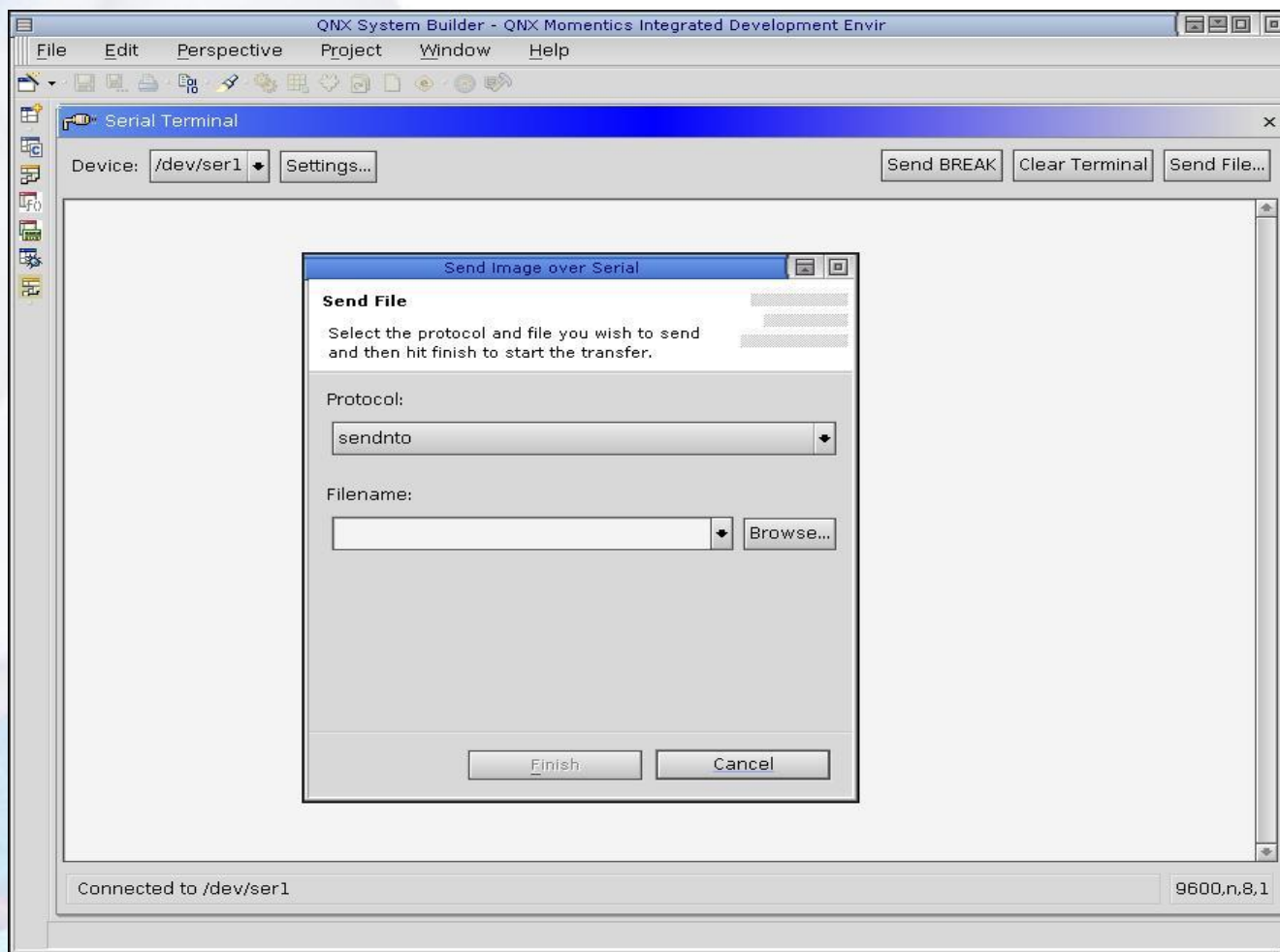
Добавление модулей в образ



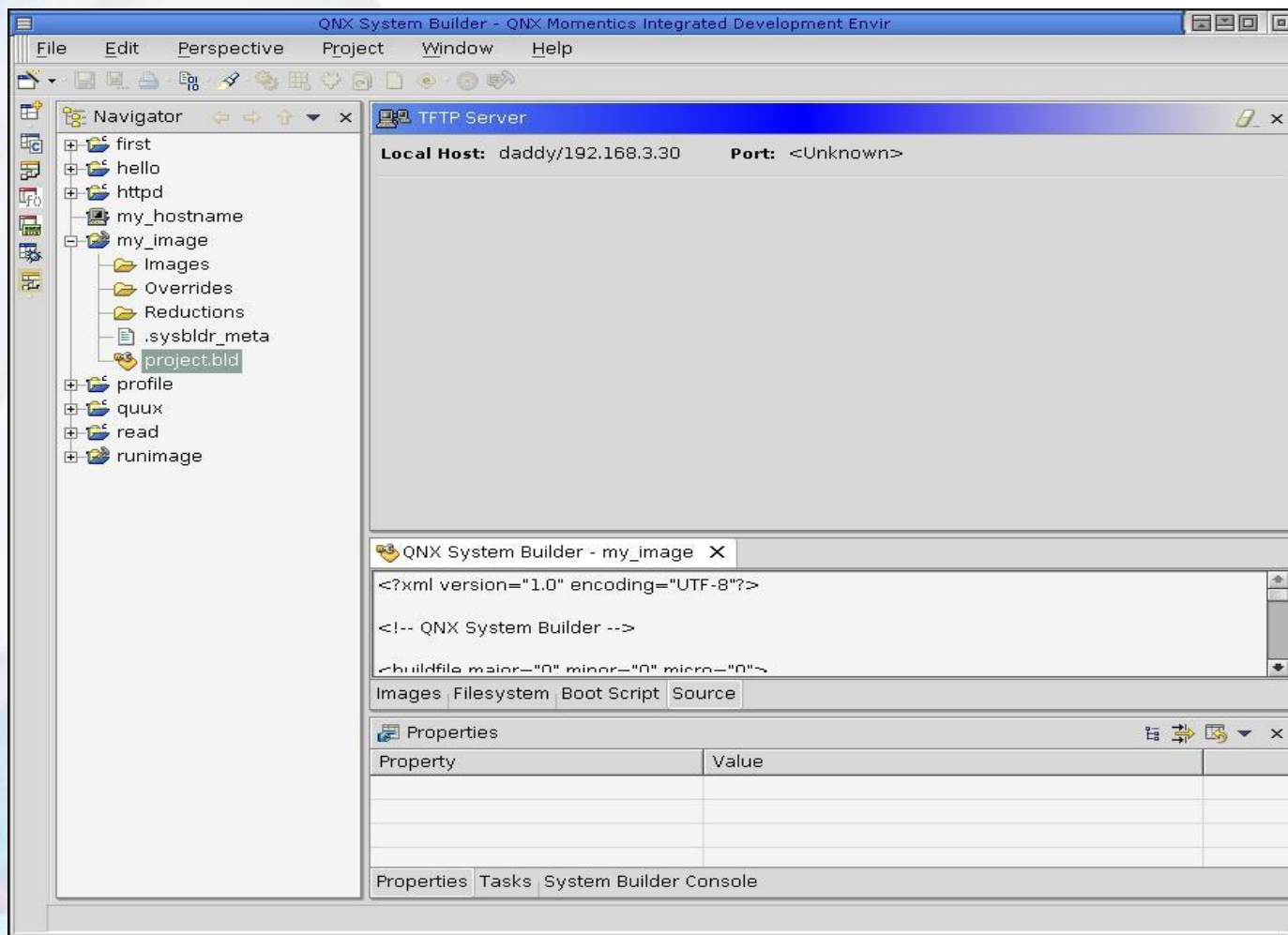
Оптимизация образа



Последовательный терминал



TFTP сервер



The screenshot displays the QNX System Builder - QNX Momentics Integrated Development Environment. The main window is titled "TFTP Server" and shows the following configuration:

- Local Host:** daddy/192.168.3.30
- Port:** <Unknown>

The left sidebar shows a project tree with the following structure:

- first
- hello
- httpd
- my_hostname
- my_image
 - Images
 - Overrides
 - Reductions
 - .sysbldr_meta
 - project.blc
- profile
- quux
- read
- runimage

The bottom panel shows the "Properties" view for the selected "my_image" component, displaying XML metadata:

```
<?xml version="1.0" encoding="UTF-8"?>  
<!-- QNX System Builder -->  
<buildfile major="0" minor="0" micro="0">  
Images | Filesystem | Boot Script | Source
```

Property	Value

At the bottom of the interface, there are tabs for "Properties", "Tasks", and "System Builder Console".

IDE предполагает, что вы будете использовать систему контроля версии для доступа к исходным кодам ваших проектов.

На данный момент IDE поддерживает следующие системы контроля версии:

✓ **CVS**

✓ **Rational ClearCase**

Добавление репозитария

New

CVS Repository Location

Remember the location of an existing CVS repository.

Connection type: pserver

User name: anoncvs

Host name: cvs.qnx.com

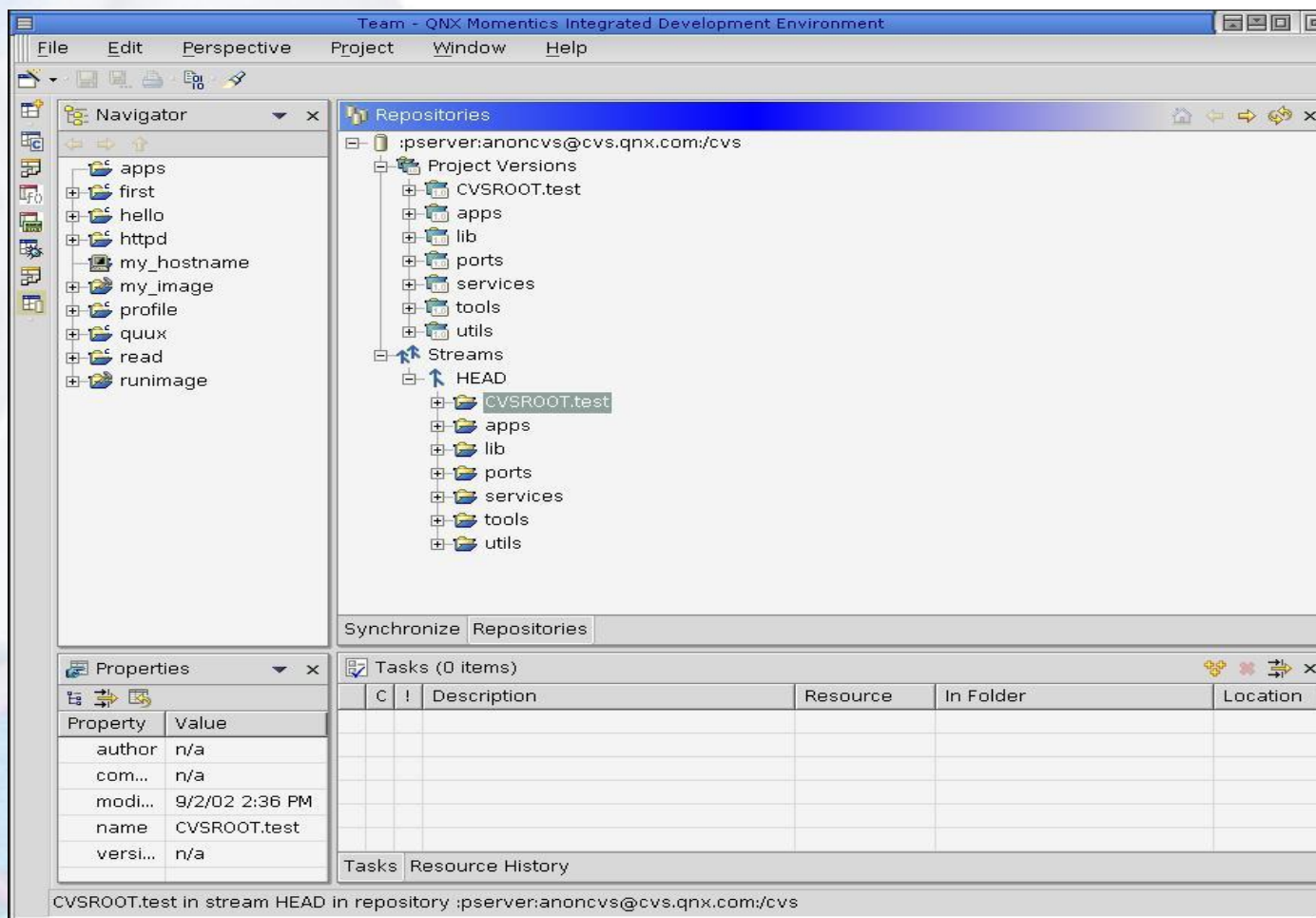
Repository path: /cvs

CVS location: :pserver:anoncvs@cvs.qnx.com:/cvs|

Validate location on finish

Finish Cancel

Team perspective



The screenshot displays the Team perspective in the QNX Momentics IDE. The interface is divided into several panes:

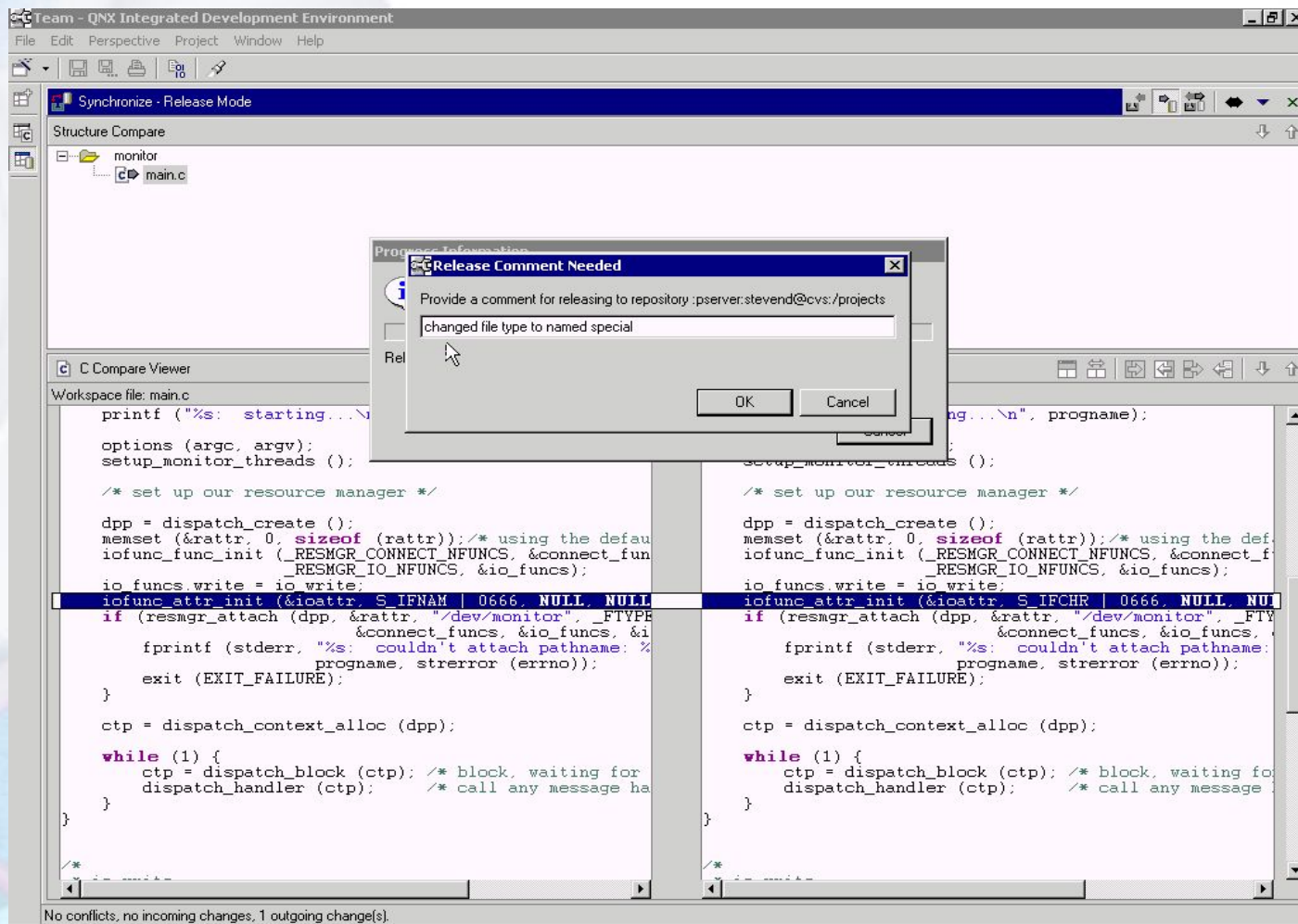
- Navigator:** Shows a project tree with folders like apps, first, hello, httpd, my_hostname, my_image, profile, quux, read, and runimage.
- Repositories:** Shows a CVS repository structure for :pserver:anoncvs@cvs.qnx.com/cvs. The tree includes Project Versions, CVSROOT.test, apps, lib, ports, services, tools, utils, Streams, and HEAD. The HEAD folder is expanded to show a sub-tree with CVSROOT.test, apps, lib, ports, services, tools, and utils.
- Properties:** Displays metadata for the selected CVSROOT.test folder, including author (n/a), comment (n/a), modification time (9/2/02 2:36 PM), name (CVSROOT.test), and version (n/a).
- Tasks:** A table showing 0 items.

Property	Value
author	n/a
com...	n/a
modi...	9/2/02 2:36 PM
name	CVSROOT.test
versi...	n/a

C	!	Description	Resource	In Folder	Location

CVSROOT.test in stream HEAD in repository :pserver:anoncvs@cvs.qnx.com/cvs

Синхронизация с репозитарием



The screenshot displays the Team - QNX Integrated Development Environment interface. A 'Synchronize - Release Mode' window is open, showing a 'Structure Compare' view of a project with files 'monitor' and 'main.c'. A 'C Compare Viewer' window is also open, displaying a side-by-side comparison of the 'main.c' file. A 'Release Comment Needed' dialog box is overlaid on the code, prompting the user to provide a comment for releasing to the repository. The dialog box contains the text: 'Provide a comment for releasing to repository :pserver.stevend@cvs:/projects' and a text input field with the value 'changed file type to named special'. The dialog box has 'OK' and 'Cancel' buttons. The code in the 'C Compare Viewer' shows a function 'main' that sets up a resource manager and a dispatch context. The code is identical in both windows, with the only difference being the file type change mentioned in the dialog box. The status bar at the bottom of the IDE indicates 'No conflicts, no incoming changes, 1 outgoing change(s)'.

```
printf ("%s: starting...\n", progname);

options (argc, argv);
setup_monitor_threads ();

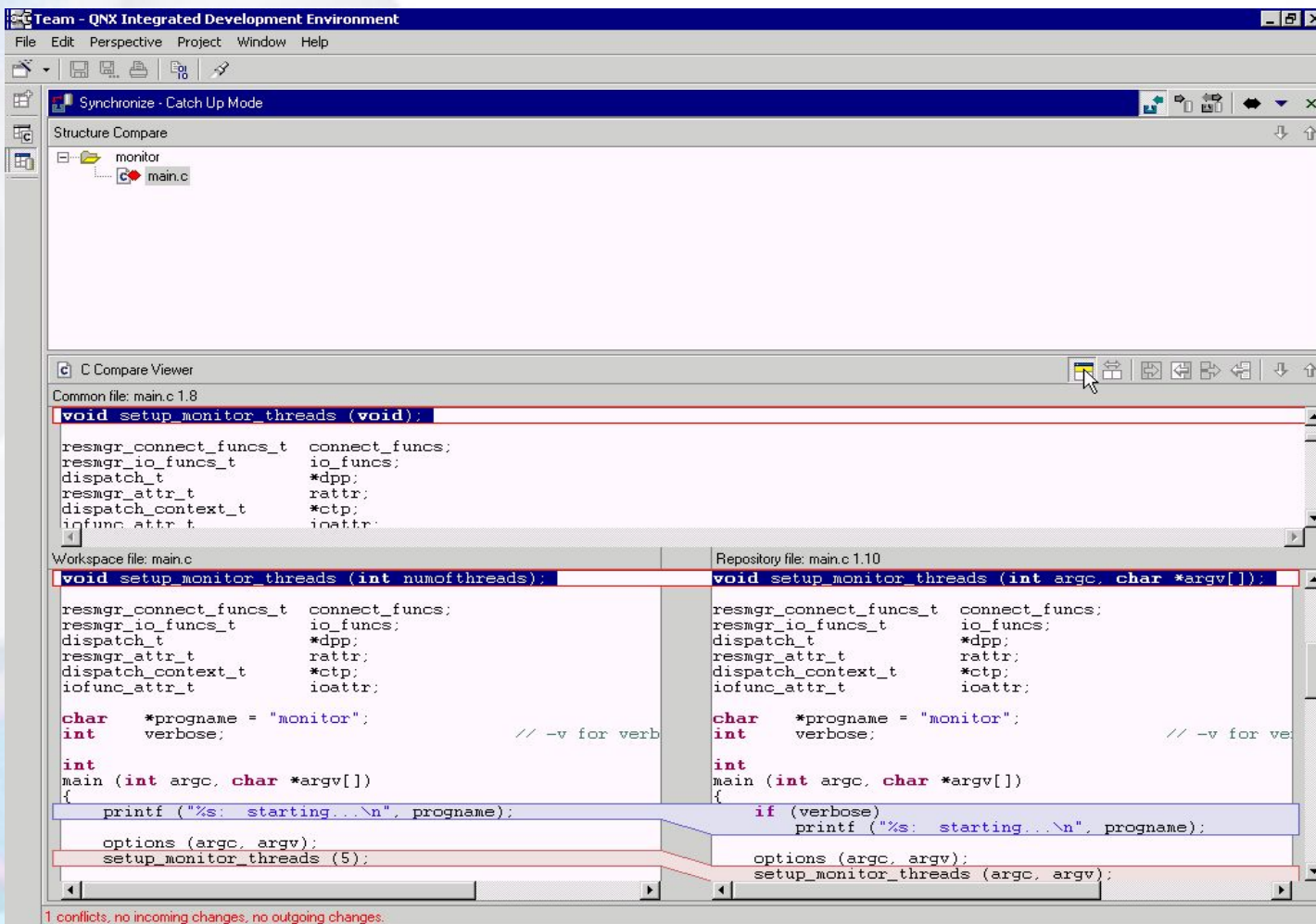
/* set up our resource manager */
dpp = dispatch_create ();
memset (&rattr, 0, sizeof (rattr)); /* using the default
iofunc_func_init (_RESMGR_CONNECT_NFUNCS, &connect_func,
                 _RESMGR_IO_NFUNCS, &io_funcs);
io_funcs.write = io_write;
iofunc_attr_init (&ioattr, S_IFNAM | 0666, NULL, NULL);
if (resmgr_attach (dpp, &rattr, "/dev/monitor", _FTYPE
                  &connect_funcs, &io_funcs, &ioattr))
    fprintf (stderr, "%s: couldn't attach pathname: %s\n",
            progname, strerror (errno));
    exit (EXIT_FAILURE);
}

ctp = dispatch_context_alloc (dpp);

while (1) {
    ctp = dispatch_block (ctp); /* block, waiting for
    dispatch_handler (ctp); /* call any message handler
}

/*
 *
 */
```


Устранение конфликтов



The screenshot displays the Team IDE interface in Synchronize - Catch Up Mode. The Structure Compare window shows a comparison between the workspace file 'main.c' and the repository file 'main.c 1.10'. The C Compare Viewer shows the following code:

```
Common file: main.c 1.8
void setup_monitor_threads (void);

resmgr_connect_funcs_t connect_funcs;
resmgr_io_funcs_t io_funcs;
dispatch_t *dpp;
resmgr_attr_t rattr;
dispatch_context_t *ctp;
iofunc_attr_t ioattr;

Workspace file: main.c
void setup_monitor_threads (int numofthreads);

resmgr_connect_funcs_t connect_funcs;
resmgr_io_funcs_t io_funcs;
dispatch_t *dpp;
resmgr_attr_t rattr;
dispatch_context_t *ctp;
iofunc_attr_t ioattr;

char *progrname = "monitor";
int verbose; // -v for verb

int main (int argc, char *argv[])
{
    printf ("%s: starting...\n", progrname);
    options (argc, argv);
    setup_monitor_threads (5);
}

Repository file: main.c 1.10
void setup_monitor_threads (int argc, char *argv[]):

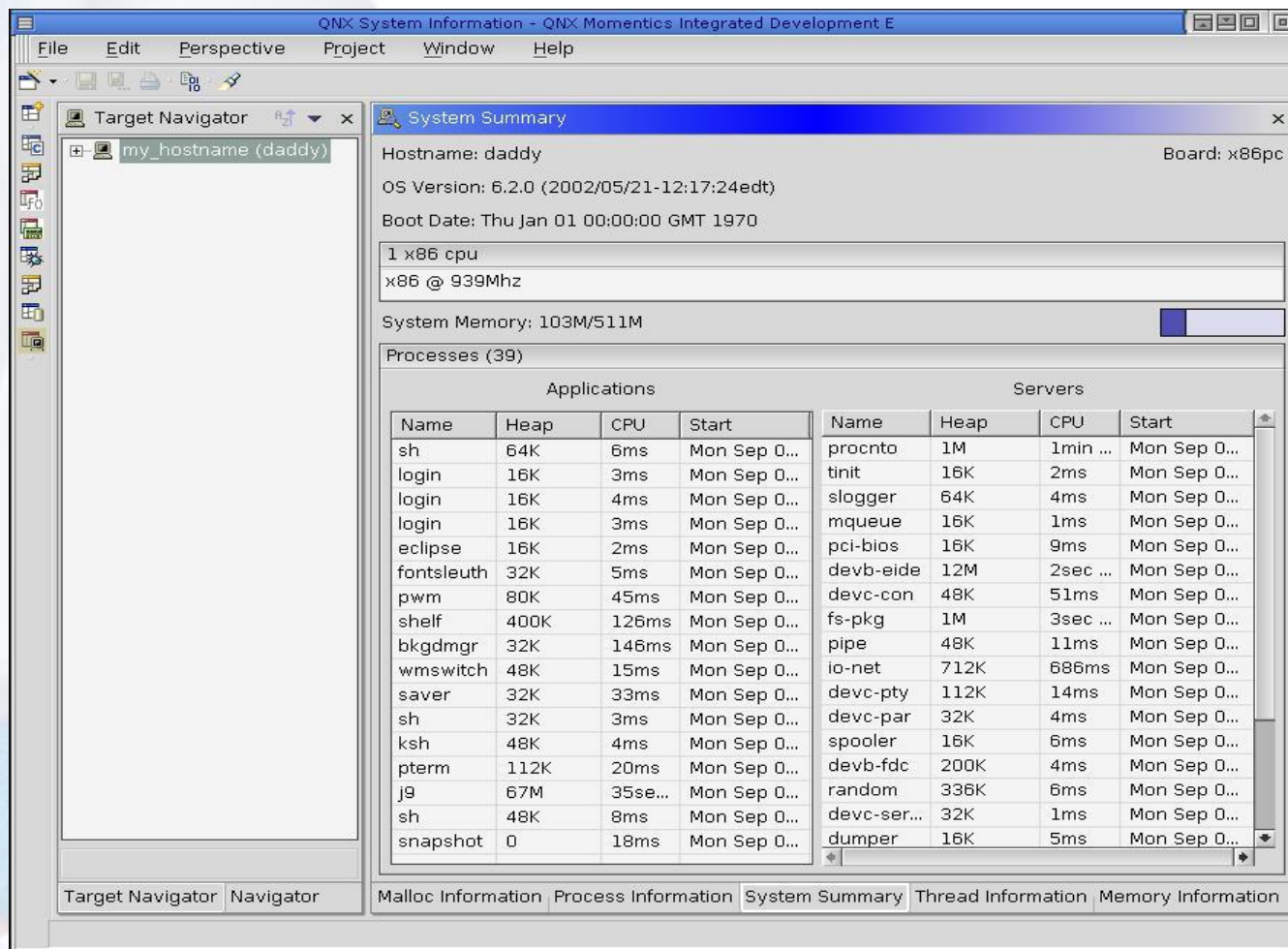
resmgr_connect_funcs_t connect_funcs;
resmgr_io_funcs_t io_funcs;
dispatch_t *dpp;
resmgr_attr_t rattr;
dispatch_context_t *ctp;
iofunc_attr_t ioattr;

char *progrname = "monitor";
int verbose; // -v for verb

int main (int argc, char *argv[])
{
    if (verbose)
        printf ("%s: starting...\n", progrname);
    options (argc, argv);
    setup_monitor_threads (argc, argv);
}
```

1 conflicts, no incoming changes, no outgoing changes.

System Information Perspective



QNX System Information - QNX Momentics Integrated Development E

File Edit Perspective Project Window Help

Target Navigator my_hostname (daddy)

System Summary

Hostname: daddy Board: x86pc

OS Version: 6.2.0 (2002/05/21-12:17:24edt)

Boot Date: Thu Jan 01 00:00:00 GMT 1970

1 x86 cpu
x86 @ 939Mhz

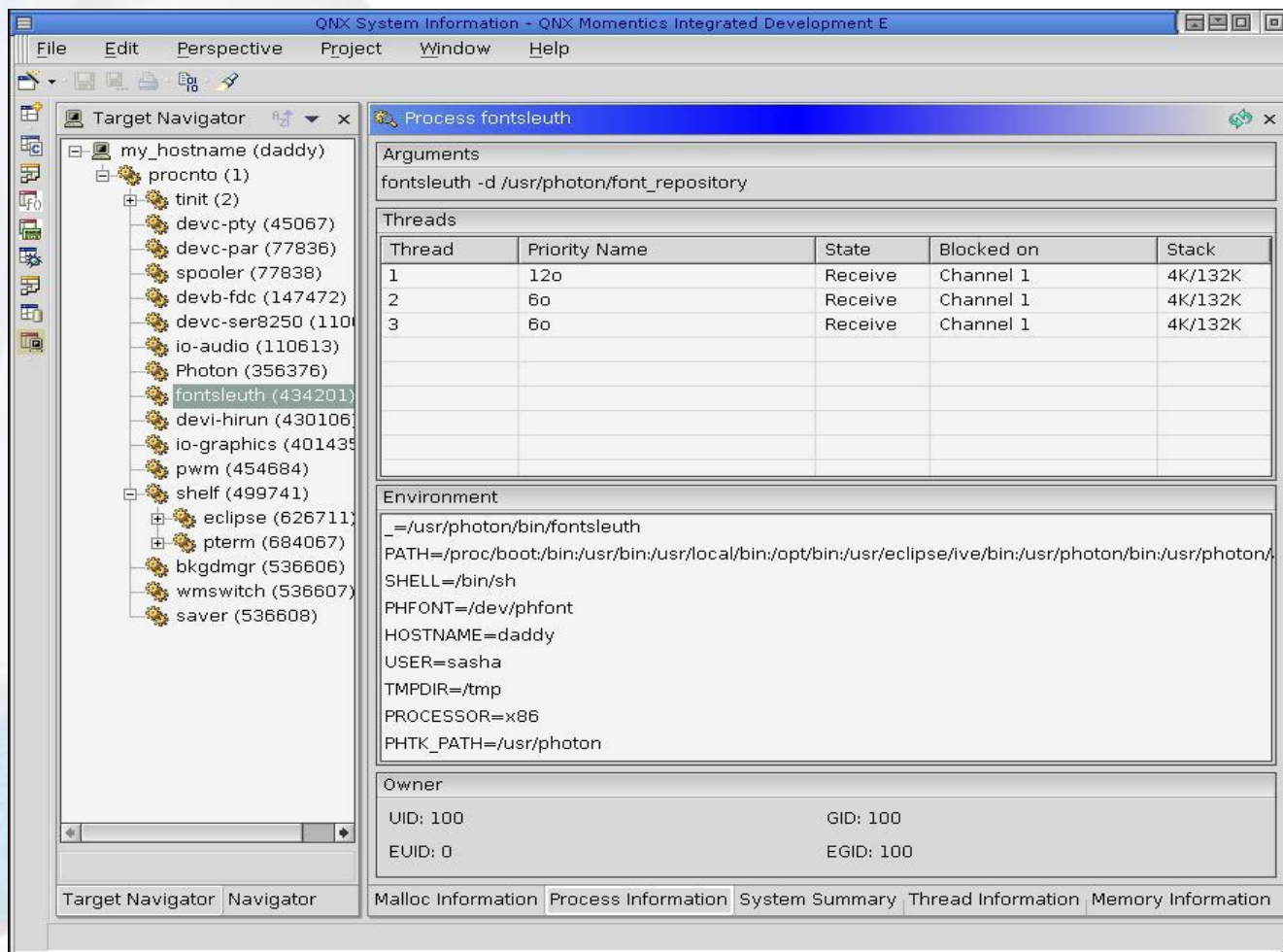
System Memory: 103M/511M

Processes (39)

Applications				Servers			
Name	Heap	CPU	Start	Name	Heap	CPU	Start
sh	64K	6ms	Mon Sep 0...	procnto	1M	1min ...	Mon Sep 0...
login	16K	3ms	Mon Sep 0...	tinit	16K	2ms	Mon Sep 0...
login	16K	4ms	Mon Sep 0...	slogger	64K	4ms	Mon Sep 0...
login	16K	3ms	Mon Sep 0...	mqueue	16K	1ms	Mon Sep 0...
eclipse	16K	2ms	Mon Sep 0...	pci-bios	16K	9ms	Mon Sep 0...
fontsl euth	32K	5ms	Mon Sep 0...	devb-eide	12M	2sec ...	Mon Sep 0...
pwm	80K	45ms	Mon Sep 0...	devc-con	48K	51ms	Mon Sep 0...
shelf	400K	126ms	Mon Sep 0...	fs-pkg	1M	3sec ...	Mon Sep 0...
bkgdmgr	32K	146ms	Mon Sep 0...	pipe	48K	11ms	Mon Sep 0...
wmswitch	48K	15ms	Mon Sep 0...	io-net	712K	686ms	Mon Sep 0...
saver	32K	33ms	Mon Sep 0...	devc-pty	112K	14ms	Mon Sep 0...
sh	32K	3ms	Mon Sep 0...	devc-par	32K	4ms	Mon Sep 0...
ksh	48K	4ms	Mon Sep 0...	spooler	16K	6ms	Mon Sep 0...
pterm	112K	20ms	Mon Sep 0...	devb-fdc	200K	4ms	Mon Sep 0...
j9	67M	35se...	Mon Sep 0...	random	336K	6ms	Mon Sep 0...
sh	48K	8ms	Mon Sep 0...	devc-ser...	32K	1ms	Mon Sep 0...
snapshot	0	18ms	Mon Sep 0...	dumper	16K	5ms	Mon Sep 0...

Target Navigator Navigator Malloc Information Process Information System Summary Thread Information Memory Information

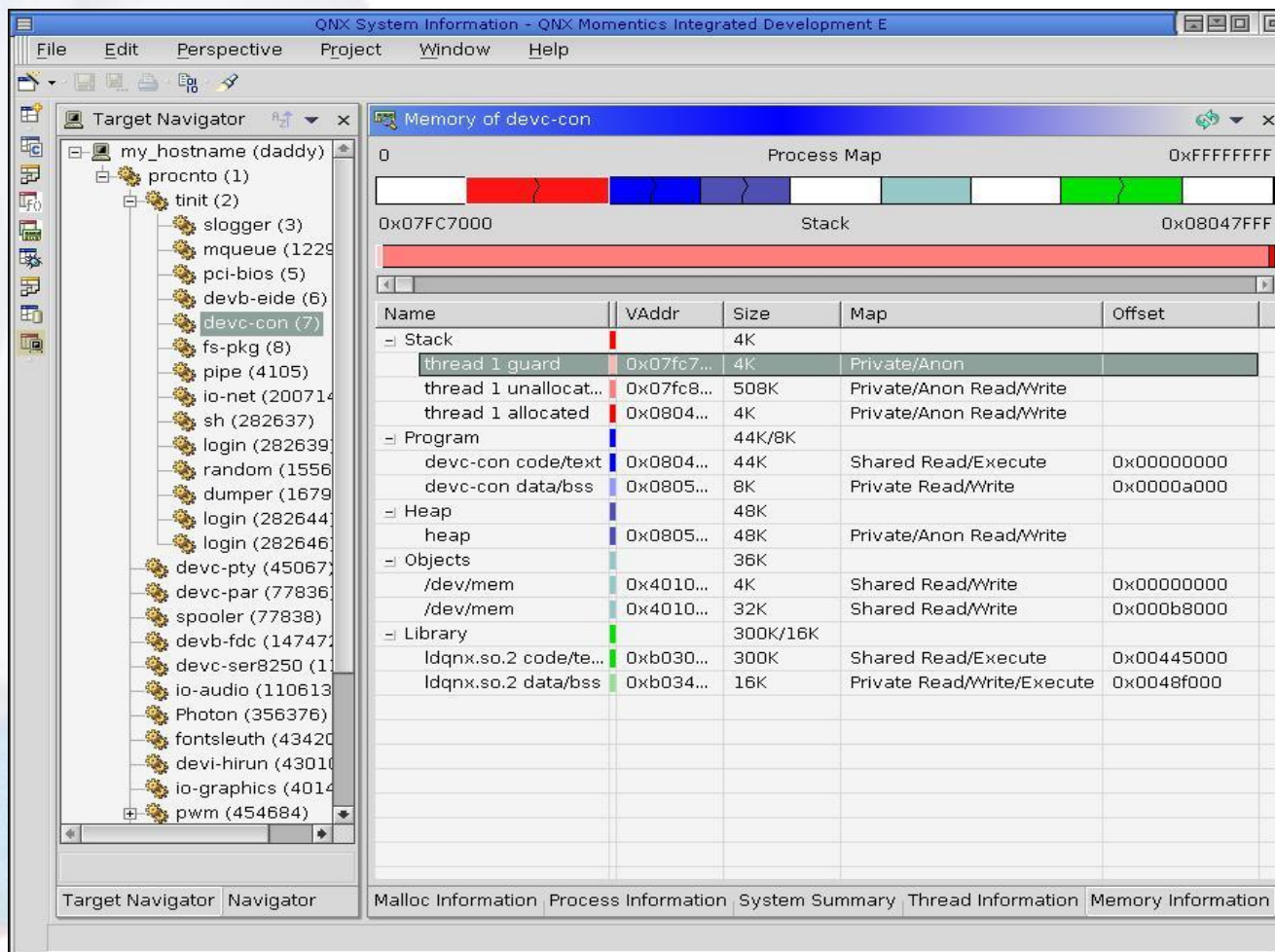
Информация о процессах



The screenshot displays the QNX System Information tool interface. The main window is titled "QNX System Information - QNX Momentics Integrated Development E". The interface is divided into several panes:

- Target Navigator:** Shows a tree view of the system hierarchy. The "fontsleuth (434201)" process is selected under the "Photon (356376)" directory.
- Process fontsleuth:** The main pane showing details for the selected process.
 - Arguments:** fontsleuth -d /usr/photon/font_repository
 - Threads:** A table showing three threads, all in a "Receive" state, blocked on "Channel 1".
 - Environment:** A list of environment variables including PATH, SHELL, PHFONT, HOSTNAME, USER, TMPDIR, PROCESSOR, and PHTK_PATH.
 - Owner:** UID: 100, GID: 100, EUID: 0, EGID: 100.
- Bottom Panel:** Contains tabs for "Malloc Information", "Process Information", "System Summary", "Thread Information", and "Memory Information".

Информация о памяти

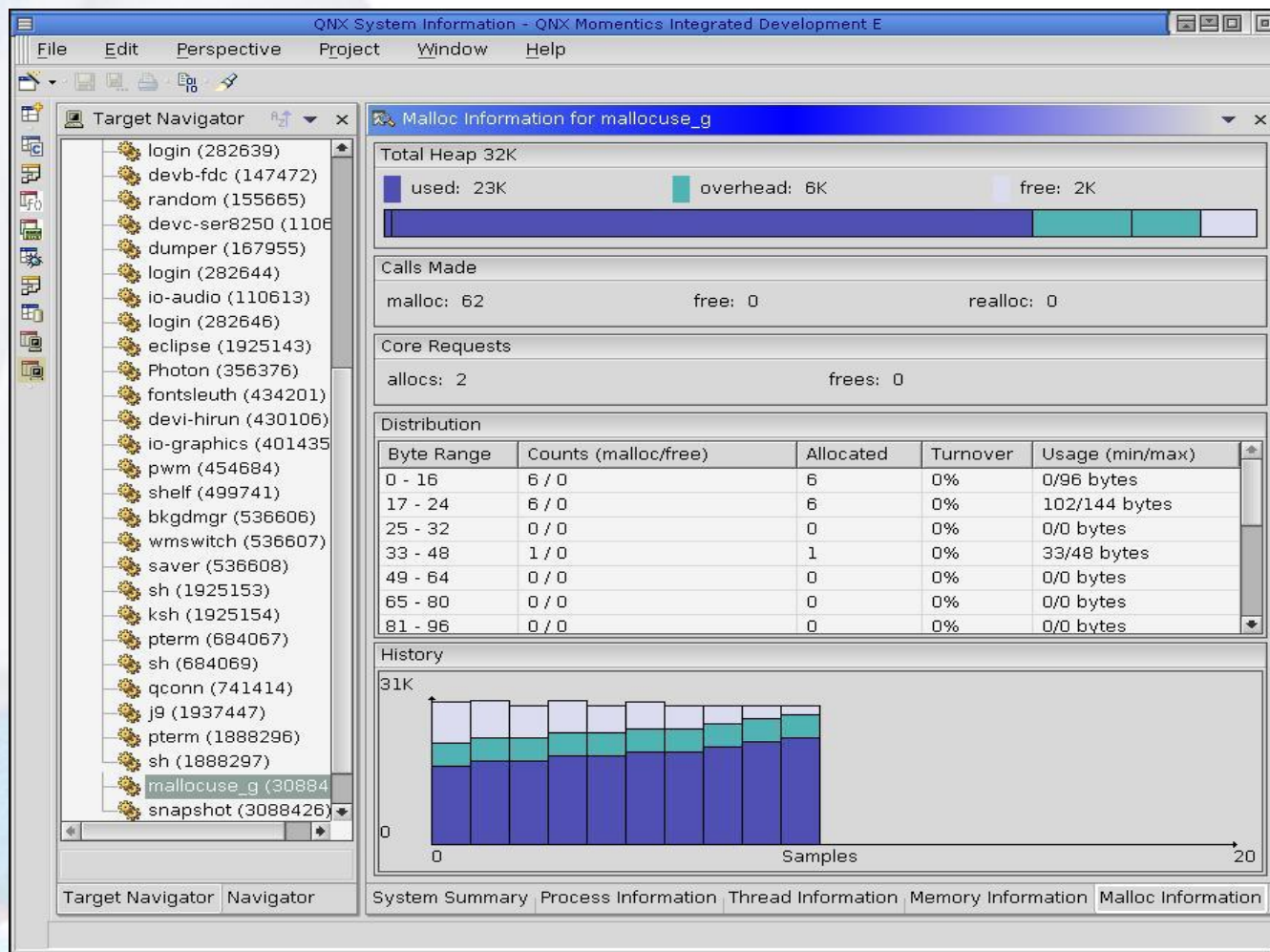


The screenshot displays the QNX System Information tool interface. The main window is titled "Memory of devc-con". On the left, the "Target Navigator" shows a tree view of the system components, with "devc-con (7)" selected. The main area shows a "Process Map" at the top, followed by a "Stack" section with a red bar representing the stack memory. Below this is a table listing memory segments for the process.

Name	VAddr	Size	Map	Offset
Stack		4K		
thread 1 guard	0x07fc7...	4K	Private/Anon	
thread 1 unallocat...	0x07fc8...	508K	Private/Anon Read/Write	
thread 1 allocated	0x0804...	4K	Private/Anon Read/Write	
Program		44K/8K		
devc-con code/text	0x0804...	44K	Shared Read/Execute	0x00000000
devc-con data/bss	0x0805...	8K	Private Read/Write	0x0000a000
Heap		48K		
heap	0x0805...	48K	Private/Anon Read/Write	
Objects		36K		
/dev/mem	0x4010...	4K	Shared Read/Write	0x00000000
/dev/mem	0x4010...	32K	Shared Read/Write	0x0000b8000
Library		300K/16K		
ldqnx.so.2 code/te...	0xb030...	300K	Shared Read/Execute	0x00445000
ldqnx.so.2 data/bss	0xb034...	16K	Private Read/Write/Execute	0x0048f000

At the bottom of the window, there are tabs for "Malloc Information", "Process Information", "System Summary", "Thread Information", and "Memory Information".

Информация о выделении памяти



QNX System Information - QNX Momentics Integrated Development E

File Edit Perspective Project Window Help

Target Navigator

- login (282639)
- devb-fdc (147472)
- random (155665)
- devc-ser8250 (1106)
- dumper (167955)
- login (282644)
- io-audio (110613)
- login (282646)
- eclipse (1925143)
- Photon (356376)
- fontleuth (434201)
- devi-hirun (430106)
- io-graphics (401435)
- pwm (454684)
- shelf (499741)
- bkgdmgr (536606)
- wmswitch (536607)
- saver (536608)
- sh (1925153)
- ksh (1925154)
- pterm (684067)
- sh (684069)
- qconn (741414)
- j9 (1937447)
- pterm (1888296)
- sh (1888297)
- mallocuse_g (30884)
- snapshot (3088426)

Malloc Information for mallocuse_g

Total Heap 32K

used: 23K overhead: 6K free: 2K

Calls Made

malloc: 62 free: 0 realloc: 0

Core Requests

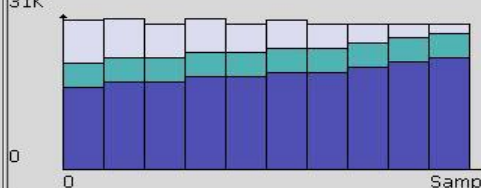
allocs: 2 frees: 0

Distribution

Byte Range	Counts (malloc/free)	Allocated	Turnover	Usage (min/max)
0 - 16	6 / 0	6	0%	0/96 bytes
17 - 24	6 / 0	6	0%	102/144 bytes
25 - 32	0 / 0	0	0%	0/0 bytes
33 - 48	1 / 0	1	0%	33/48 bytes
49 - 64	0 / 0	0	0%	0/0 bytes
65 - 80	0 / 0	0	0%	0/0 bytes
81 - 96	0 / 0	0	0%	0/0 bytes

History

31K

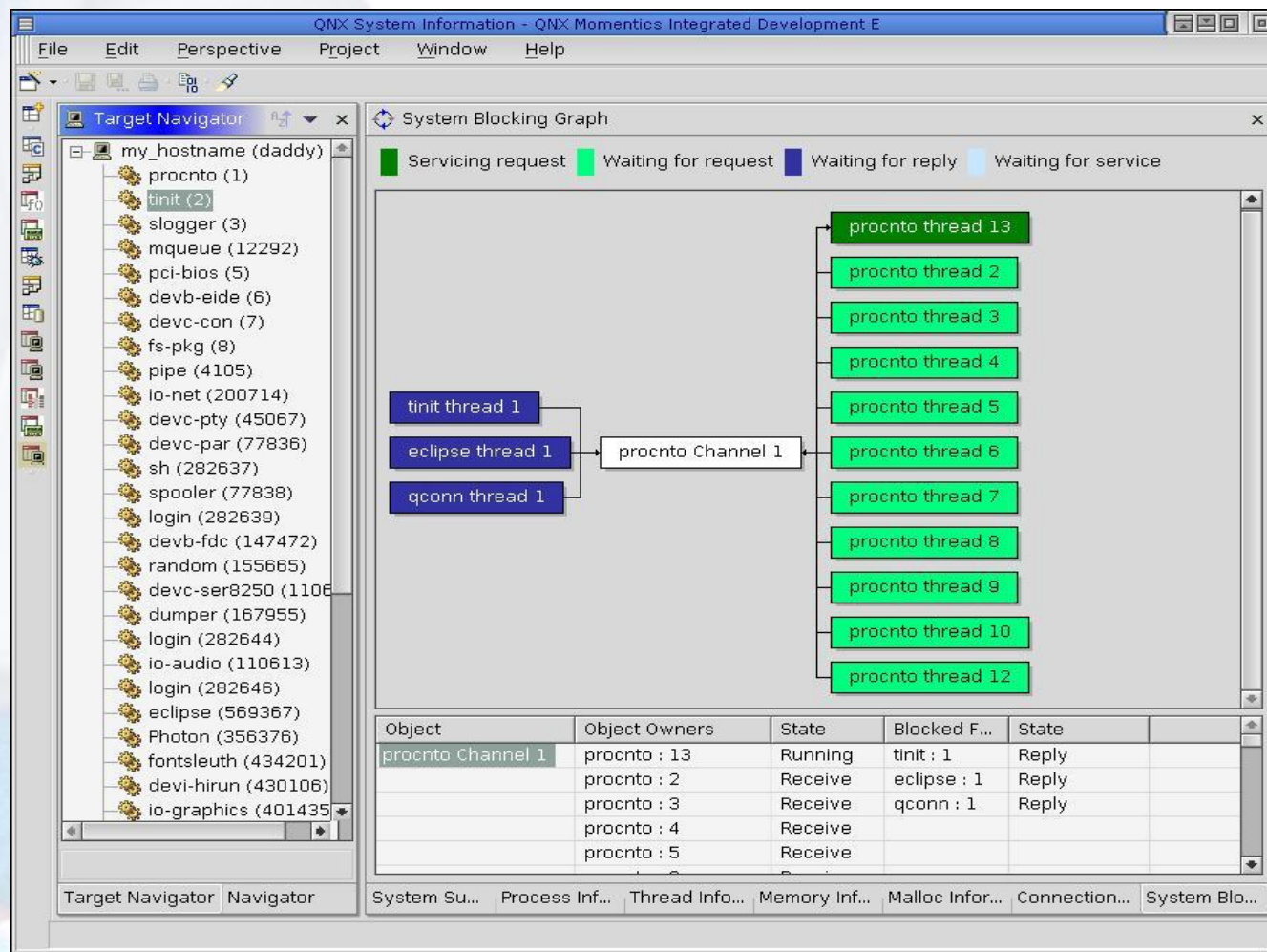


0 Samples 20

Target Navigator Navigator

System Summary Process Information Thread Information Memory Information Malloc Information

System Blocking Graph

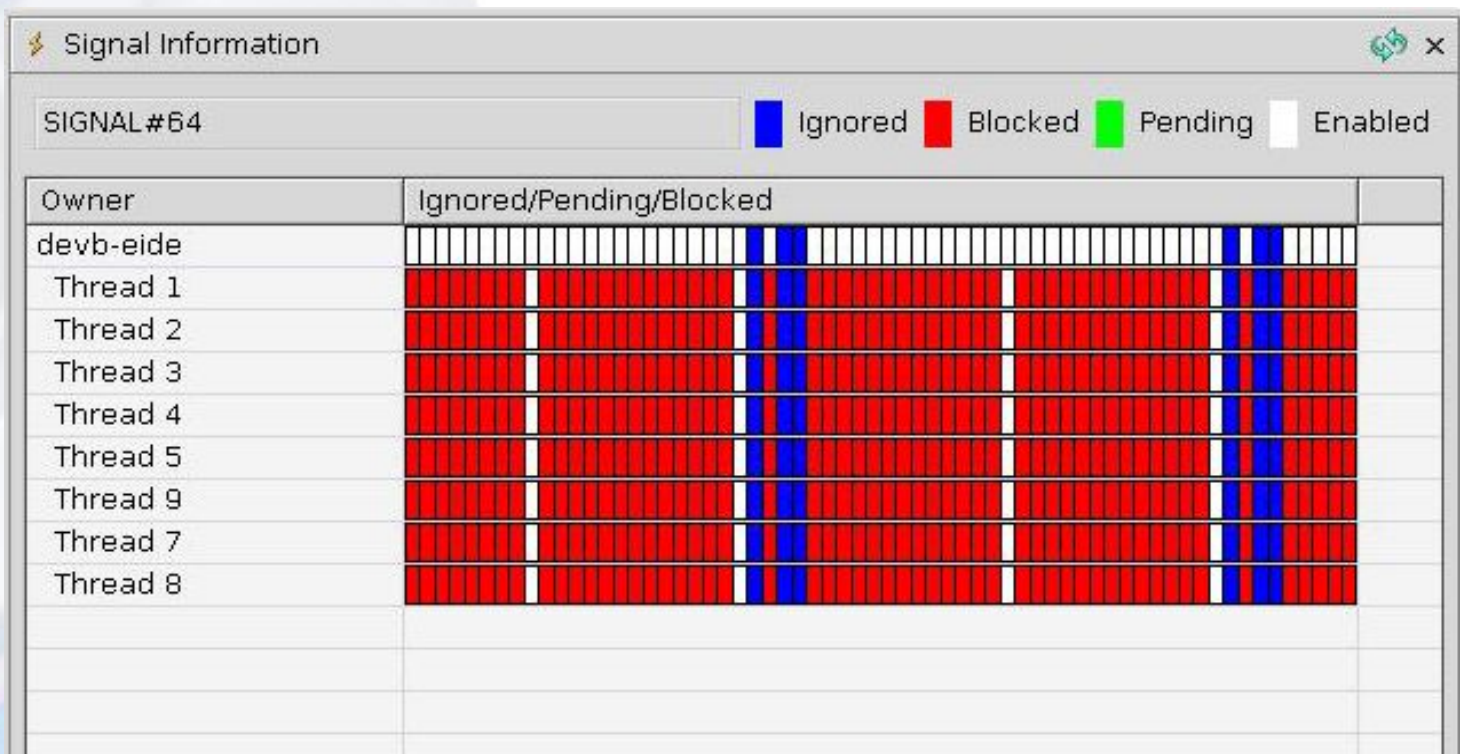


Legend:

- Servicing request
- Waiting for request
- Waiting for reply
- Waiting for service

Object	Object Owners	State	Blocked F...	State
procnto Channel 1	procnto : 13	Running	tinit : 1	Reply
	procnto : 2	Receive	eclipse : 1	Reply
	procnto : 3	Receive	qconn : 1	Reply
	procnto : 4	Receive		
	procnto : 5	Receive		

Информация о сигналах



Profiling (профилирование) – это определение участков кода, где ваша программа проводит большинство времени

Profiling помогает вам:

- ✓ сократить количество вызовов функций
- ✓ оптимизировать алгоритмы

Данные profiling состоят из двух частей:

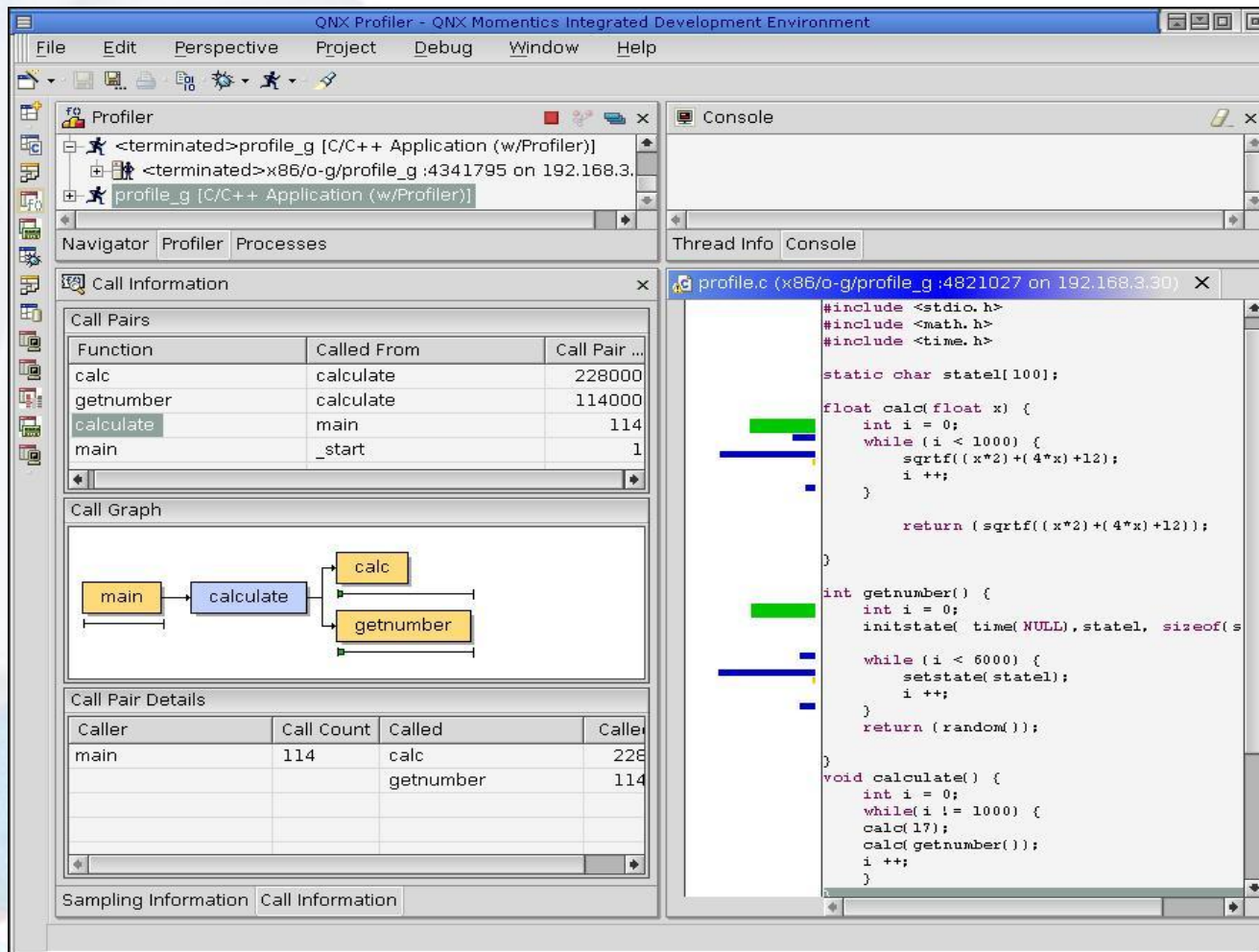
Sampling:

- ✓ Какой код выполняется
- ✓ Насколько часто выполняется код

Информация о вызовах:

- ✓ Количество вызовов функций
- ✓ Информация об инициаторе вызова

Profile perspective









The screenshot displays the QNX Profiler interface within the QNX Momentics IDE. The main window is titled "QNX Profiler - QNX Momentics Integrated Development Environment". The interface is divided into several panes:

- Profiler:** Shows the current application being profiled, "profile_g [C/C++ Application (w/Profiler)]".
- Call Information:** Contains a "Call Pairs" table and a "Call Graph".

Function	Called From	Call Pair ...
calc	calculate	228000
getnumber	calculate	114000
calculate	main	114
main	_start	1

Caller	Call Count	Called	Caller
main	114	calc	228
		getnumber	114
- Console:** Shows the output of the application, including the execution of the "profile.c" file.
- Code Editor:** Displays the source code for "profile.c", which includes functions like "calc", "getnumber", and "calculate".

Sampling information

Function	Total Time (s)	Time since ...	Call Count	usec/Call	% Time Usage
setstate	32.886	0.000			
sqrtf	19.100	0.000			
_FDunscale	4.535	0.000			
_FDscale	3.735	0.000			
calc	3.177	0.000	680000	4.672	
getnumber	2.966	0.000	340000	8.724	
.plt	0.650	0.000			
sqrtf	0.292	0.000			
random	0.213	0.000			
srandom	0.066	0.000			
_udivdi3	0.007	0.000			
initstate	0.006	0.000			
time	0.004	0.000			
pthread_self	0.002	0.000			
calculate	0.001	0.000	340	2.941	
main	0.000	0.000	1		

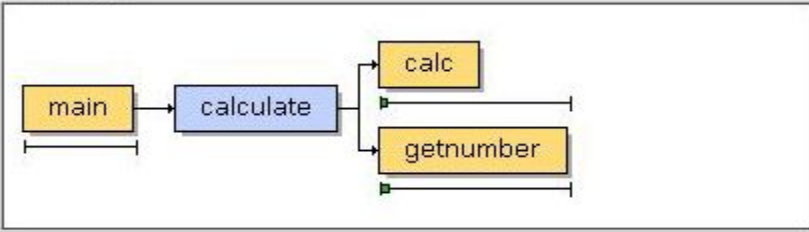
Информация о вызовах

Call Information

Call Pairs

Function	Called From	Call Pair ...
calc	calculate	228000
getnumber	calculate	114000
calculate	main	114
main	_start	1

Call Graph



```
graph LR; main[main] --> calculate[calculate]; calculate --> calc[calc]; calculate --> getnumber[getnumber];
```

Call Pair Details

Caller	Call Count	Called	Called Count
main	114	calc	228000
		getnumber	114000

Sampling Information | Call Information

Вывод информации о времени исполнения в исходном коде

```
profile.c (x86/o-g/profile_g :4821027 on 192.168.3.30) X
#include <stdlib.h>
#include <stdio.h>
#include <math.h>
#include <time.h>

static char statel[100];

float calc(float x) {
    int i = 0;
    while (i < 1000) {
        sqrtf((x*2)+(4*x)+12);
        i ++;
    }

    return (sqrtf((x*2)+(4*x)+12));
}

int getnumber() {
    int i = 0;
    initstate( time(NULL),statel, sizeof(statel));

    while (i < 6000) {
        setstate(statel);
        i ++;
    }
    return (random());
}

void calculate() {
    int i = 0;
    while(i != 1000) {
        calc(17);
        calc(getnumber());
        i ++;
    }
}

int main(int argc, char *argv[]) {
    printf("Welcome to the QNX IDE\n");
}
```

Спасибо!



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