Haiku OS

a quick look

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pkgsrcCon, 2.07.2016

Agenda

three perspectives

- User
- Developer
- Porter

What is Haiku?

- Desktop-oriented operating system
- Not Linux, not UNIX
- BeOS clone, binary compatible
- MIT licensed

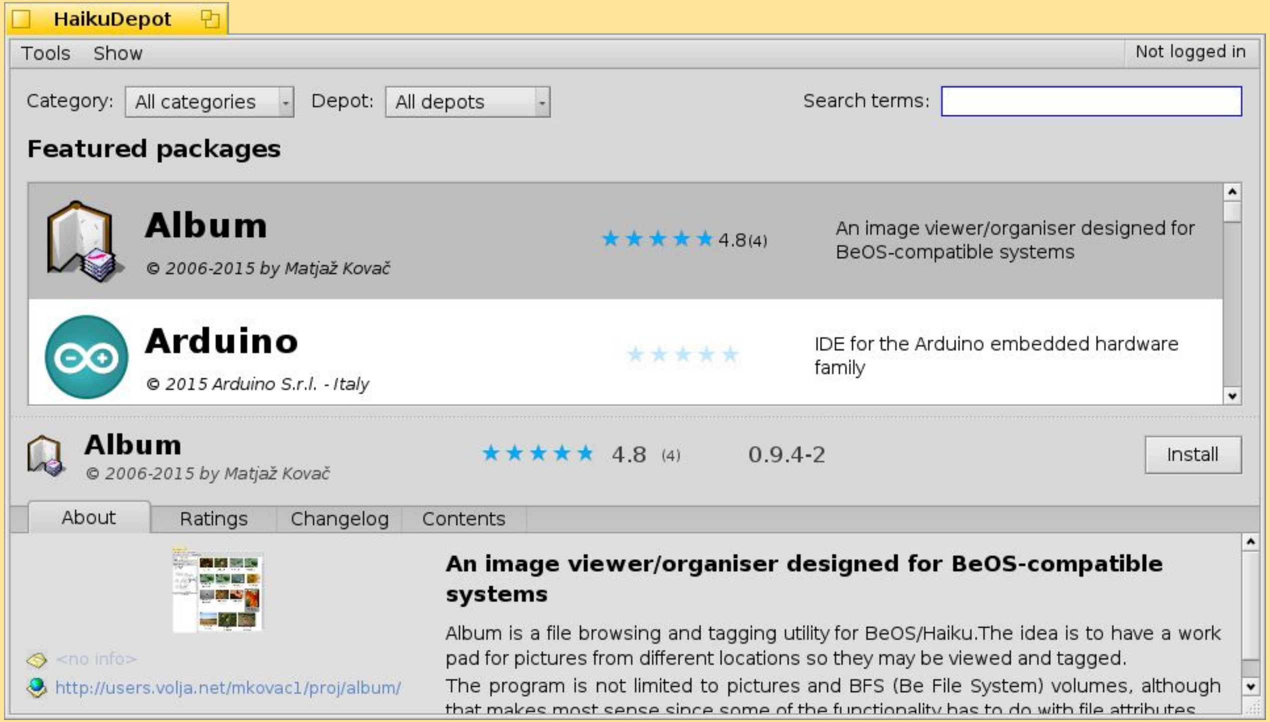
User

- Package management
- Icons
- File management
- Replicants
- Stack & Tile

Package management

- Very elegant solution
- HPKGs are being put into /packages directory
    - Metadata in .PackageInfo file inside the package
- packagefs mounts them
- Directories like /bin, /develop, etc. are virtual and read-only
- Overriding files by putting them in equivalent structure under /non-packaged
- Problems to solve:
    - Packages are being built and uploaded manually
    - No way to reproduce the package repository
        - No automatic build system deployed
        - Three have been developed

HaikuDepot



Featured packages

Album © 2006-2015 by Matjaž Kovač	★★★★★ 4.8 (4)	An image viewer/organiser designed for BeOS-compatible systems
Arduino © 2015 Arduino S.r.l. - Italy	★★★★★	IDE for the Arduino embedded hardware family

Album
© 2006-2015 by Matjaž Kovač
★★★★★ 4.8 (4) 0.9.4-2

<no info>
http://users.volja.net/mkovac1/proj/album/

An image viewer/organiser designed for BeOS-compatible systems

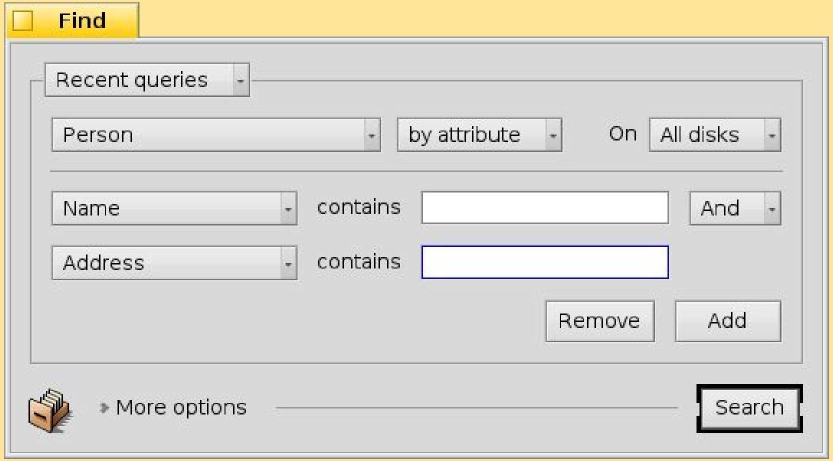
Album is a file browsing and tagging utility for BeOS/Haiku.The idea is to have a work pad for pictures from different locations so they may be viewed and tagged.
The program is not limited to pictures and BFS (Be File System) volumes, although that makes most sense since some of the functionality has to do with file attributes

Icons

- Vector icons
- Haiku Vector Icon Format (HVIF)
  - Supports LODs
- Small size (max. ~1 KiB)
  - Can be embedded in a file attribute

File management

- You can move or rename any file, regardless if it is opened somewhere
- Extensive file attributes support
  - You can define your own attributes...
  - ...and search by them...
  - ...but it creates compatibility problems

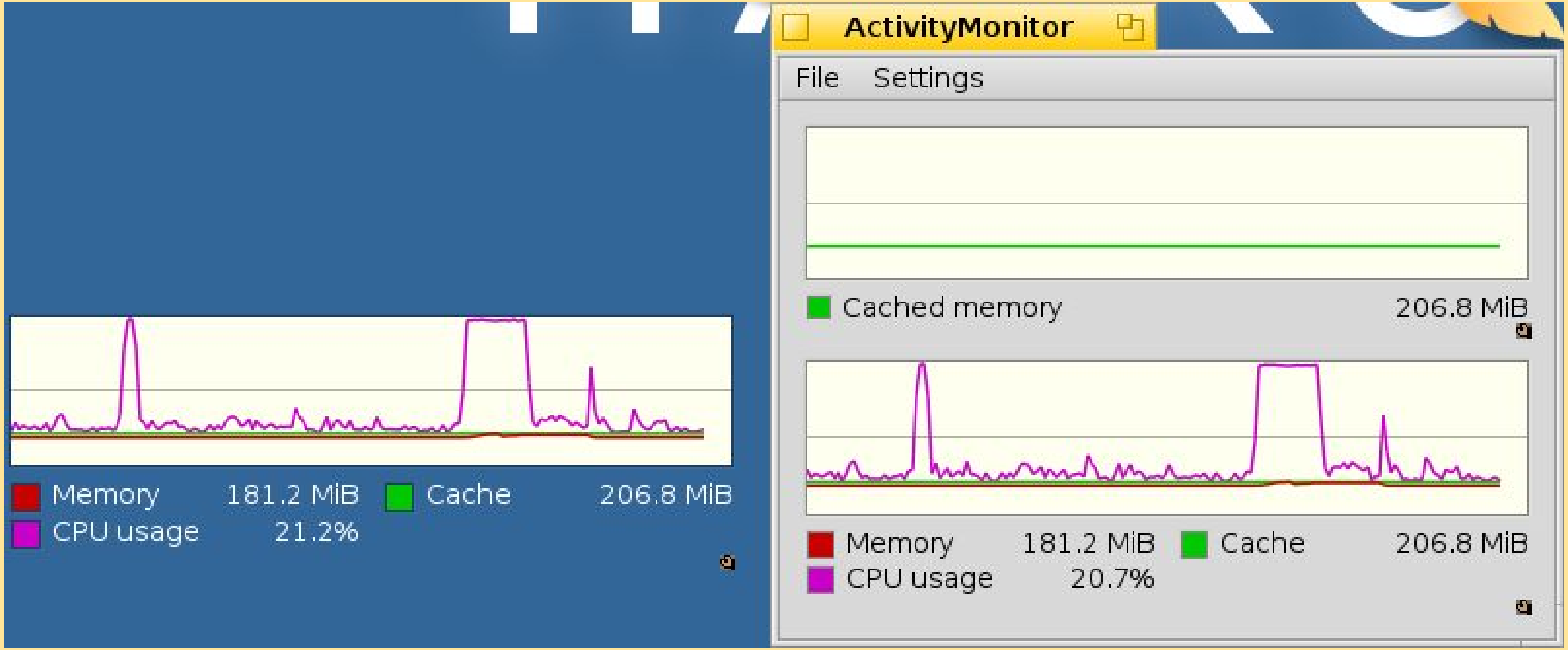


Person by attribute On All disks

Name contains And

Address contains

Replicants

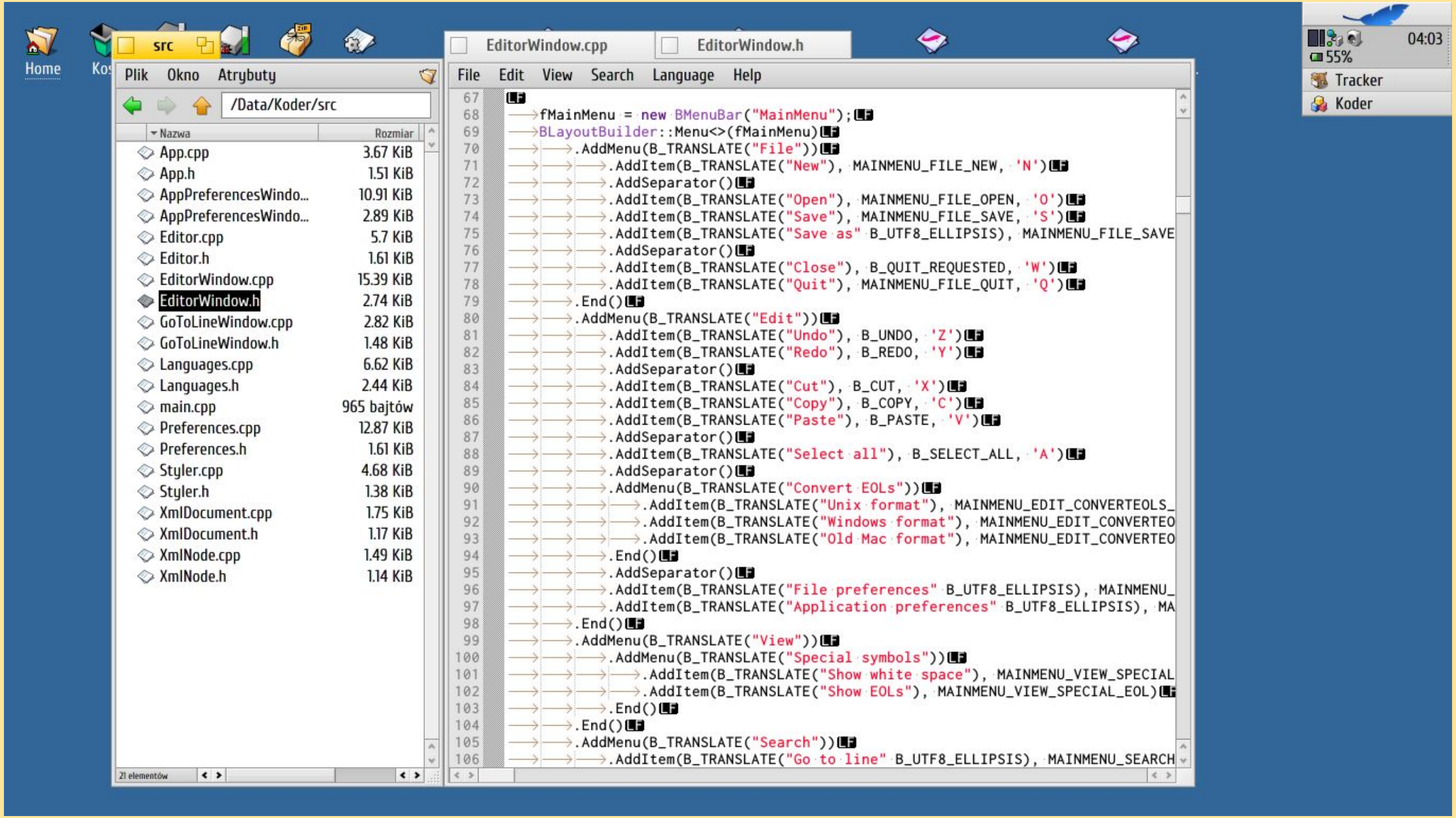


🟥 Memory 181.2 MiB 🟩 Cache 206.8 MiB
🟪 CPU usage 21.2%

🟩 Cached memory 206.8 MiB

🟥 Memory 181.2 MiB 🟩 Cache 206.8 MiB
🟪 CPU usage 20.7%

Stack & Tile



Nazwa	Rozmiar
App.cpp	3.67 KiB
App.h	1.51 KiB
AppPreferencesWindo...	10.91 KiB
AppPreferencesWindo...	2.89 KiB
Editor.cpp	5.7 KiB
Editor.h	1.61 KiB
EditorWindow.cpp	15.39 KiB
EditorWindow.h	2.74 KiB
GoToLineWindow.cpp	2.82 KiB
GoToLineWindow.h	1.48 KiB
Languages.cpp	6.62 KiB
Languages.h	2.44 KiB
main.cpp	965 bajtów
Preferences.cpp	12.87 KiB
Preferences.h	1.61 KiB
Styler.cpp	4.68 KiB
Styler.h	1.38 KiB
XmlDocument.cpp	1.75 KiB
XmlDocument.h	1.17 KiB
XmlNode.cpp	1.49 KiB
XmlNode.h	1.14 KiB

```

    fMainMenu = new BMenuBar("MainMenu");
    BLayoutBuilder::Menu<>(fMainMenu)
        .AddMenu(B_TRANSLATE("File"))
            .AddItem(B_TRANSLATE("New"), MAINMENU_FILE_NEW, 'N')
            .AddSeparator()
            .AddItem(B_TRANSLATE("Open"), MAINMENU_FILE_OPEN, 'O')
            .AddItem(B_TRANSLATE("Save"), MAINMENU_FILE_SAVE, 'S')
            .AddItem(B_TRANSLATE("Save as" B_UTF8_ELLIPSIS), MAINMENU_FILE_SAVE
            .AddSeparator()
            .AddItem(B_TRANSLATE("Close"), B_QUIT_REQUESTED, 'W')
            .AddItem(B_TRANSLATE("Quit"), MAINMENU_FILE_QUIT, 'Q')
        .End()
        .AddMenu(B_TRANSLATE("Edit"))
            .AddItem(B_TRANSLATE("Undo"), B_UNDO, 'Z')
            .AddItem(B_TRANSLATE("Redo"), B_REDO, 'Y')
            .AddSeparator()
            .AddItem(B_TRANSLATE("Cut"), B_CUT, 'X')
            .AddItem(B_TRANSLATE("Copy"), B_COPY, 'C')
            .AddItem(B_TRANSLATE("Paste"), B_PASTE, 'V')
            .AddSeparator()
            .AddItem(B_TRANSLATE("Select all"), B_SELECT_ALL, 'A')
            .AddSeparator()
            .AddMenu(B_TRANSLATE("Convert EOLs"))
                .AddItem(B_TRANSLATE("Unix format"), MAINMENU_EDIT_CONVERTEOLS_
                .AddItem(B_TRANSLATE("Windows format"), MAINMENU_EDIT_CONVERTEO
                .AddItem(B_TRANSLATE("Old Mac format"), MAINMENU_EDIT_CONVERTEO
            .End()
            .AddSeparator()
            .AddItem(B_TRANSLATE("File preferences" B_UTF8_ELLIPSIS), MAINMENU_
            .AddItem(B_TRANSLATE("Application preferences" B_UTF8_ELLIPSIS), MA
        .End()
        .AddMenu(B_TRANSLATE("View"))
            .AddMenu(B_TRANSLATE("Special symbols"))
                .AddItem(B_TRANSLATE("Show white space"), MAINMENU_VIEW_SPECIAL
                .AddItem(B_TRANSLATE("Show EOLs"), MAINMENU_VIEW_SPECIAL_EOL)
            .End()
        .End()
        .AddMenu(B_TRANSLATE("Search"))
            .AddItem(B_TRANSLATE("Go to line" B_UTF8_ELLIPSIS), MAINMENU_SEARCH
```

Developer

- BeAPI
- Hybrid builds
- Debugger
- Translators
- Qt
- Java
- Contributing

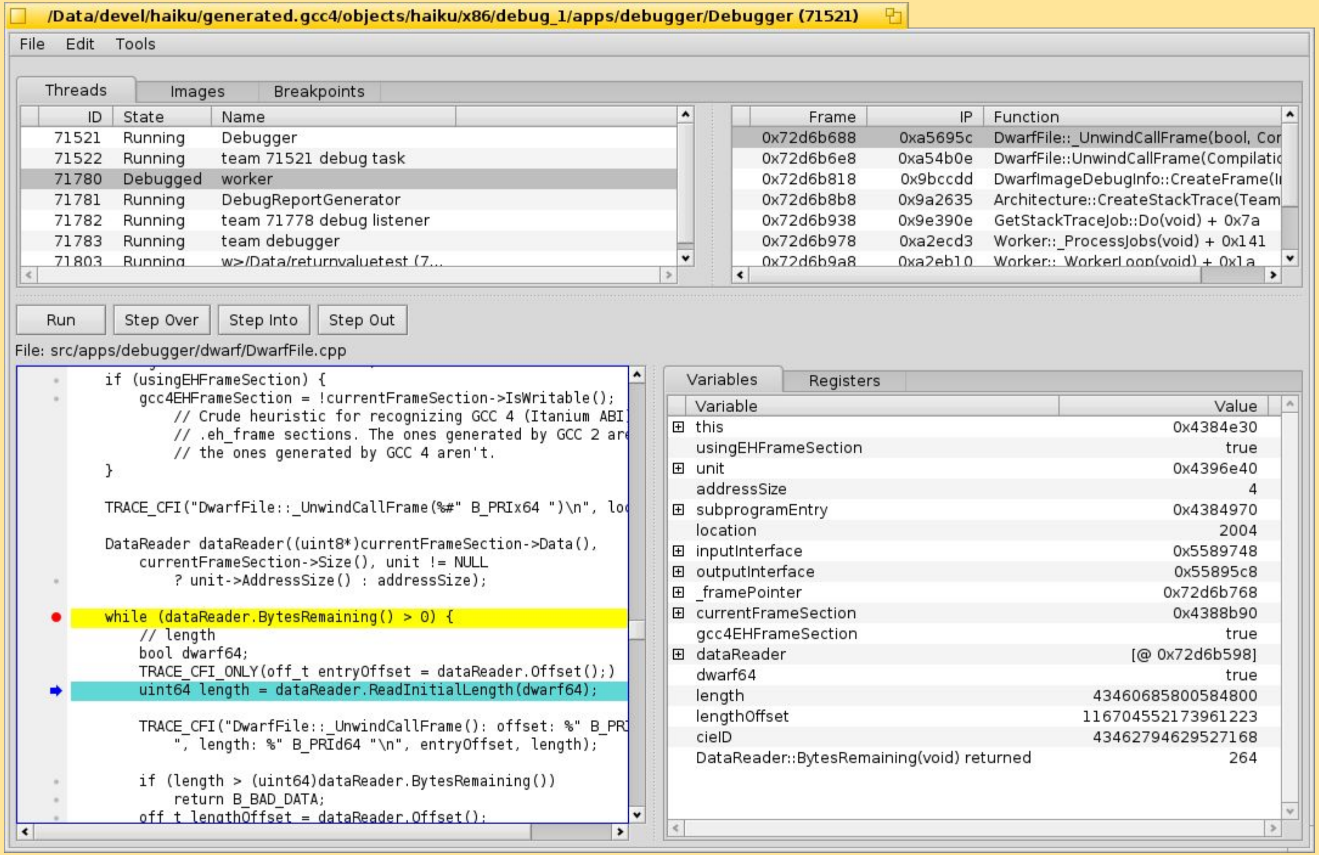
BeAPI

- Native language: C++
- Object Oriented but nowadays a bit dated
- New in Haiku:
  - LayoutKit
  - LocaleKit
  - NetworkKit
  - CryptoKit (WIP, recently started)
- Creating bindings is problematic
- GUI programming only with C++ or yab (or bash with `dialog` clones)

Hybrid builds

- Due to binary compatibility goal Haiku still uses GCC 2.95
- Hybrid builds ship with both GCC2 and GCC5
  - GCC2 for the main OS
  - GCC5 for userland applications
- Official release is GCC2 with GCC5 userland libraries
- Unsupported builds:
  - GCC5 with GCC2 userland libs
  - GCC2/5 only

Debugger


/Data/devel/haiku/generated.gcc4/objects/haiku/x86/debug_1/apps/debugger/Debugger (71521)
File
Edit
Tools
Threads
Images
Breakpoints
Run
Step Over
Step Into
Step Out
Variables
Registers

ID	State	Name
71521	Running	Debugger
71522	Running	team 71521 debug task
71780	Debugged	worker
71781	Running	DebugReportGenerator
71782	Running	team 71778 debug listener
71783	Running	team debugger
71803	Running	w>/Data/returnvaluetest (7...

Frame	IP	Function
0x72d6b688	0xa5695c	DwarfFile::_UnwindCallFrame(bool, Cor
0x72d6b6e8	0xa54b0e	DwarfFile::UnwindCallFrame(Compilatio
0x72d6b818	0x9bccdd	DwarfImageDebugInfo::CreateFrame(I
0x72d6b8b8	0x9a2635	Architecture::CreateStackTrace(Team
0x72d6b938	0x9e390e	GetStackTraceJob::Do(void) + 0x7a
0x72d6b978	0xa2ecd3	Worker::_ProcessJobs(void) + 0x141
0x72d6b9a8	0xa2eb10	Worker::_WorkerLoop(void) + 0x1a

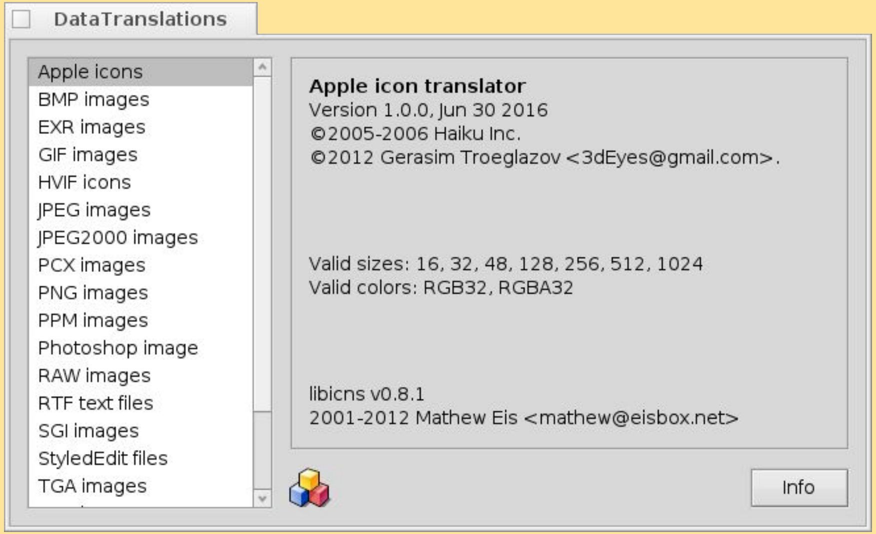
File: src/apps/debugger/dwarf/DwarfFile.cpp

```
    if (usingEHFrameSection) {
        gcc4EHFrameSection = !currentFrameSection->IsWritable();
            // Crude heuristic for recognizing GCC 4 (Itanium ABI
            // .eh_frame sections. The ones generated by GCC 2 are
            // the ones generated by GCC 4 aren't.
    }

    TRACE_CFI("DwarfFile::_UnwindCallFrame(%#" B_PRIx64 ")\n", lo

    DataReader dataReader((uint8*)currentFrameSection->Data(),
        currentFrameSection->Size(), unit != NULL
            ? unit->AddressSize() : addressSize);

●   while (dataReader.BytesRemaining() > 0) {
        // length
        bool dwarf64;
        TRACE_CFI_ONLY(off_t entryOffset = dataReader.Offset();)
➡       uint64 length = dataReader.ReadInitialLength(dwarf64);

        TRACE_CFI("DwarfFile::_UnwindCallFrame(): offset: %" B_PRI
            ", length: %" B_PRId64 "\n", entryOffset, length);

        if (length > (uint64)dataReader.BytesRemaining())
            return B_BAD_DATA;
        off_t lengthOffset = dataReader.Offset();
```

Variable	Value
⊞ this	0x4384e30
usingEHFrameSection	true
⊞ unit	0x4396e40
addressSize	4
⊞ subprogramEntry	0x4384970
location	2004
⊞ inputInterface	0x5589748
⊞ outputInterface	0x55895c8
⊞ _framePointer	0x72d6b768
⊞ currentFrameSection	0x4388b90
gcc4EHFrameSection	true
⊞ dataReader	[@ 0x72d6b598]
dwarf64	true
length	4346068580058480 0
lengthOffset	1167045521739612 23
cieID	4346279462952716 8
DataReader::BytesRemaining(void) returned	264

Translators

- OS-wide plugin system
- Applications can easily support many formats



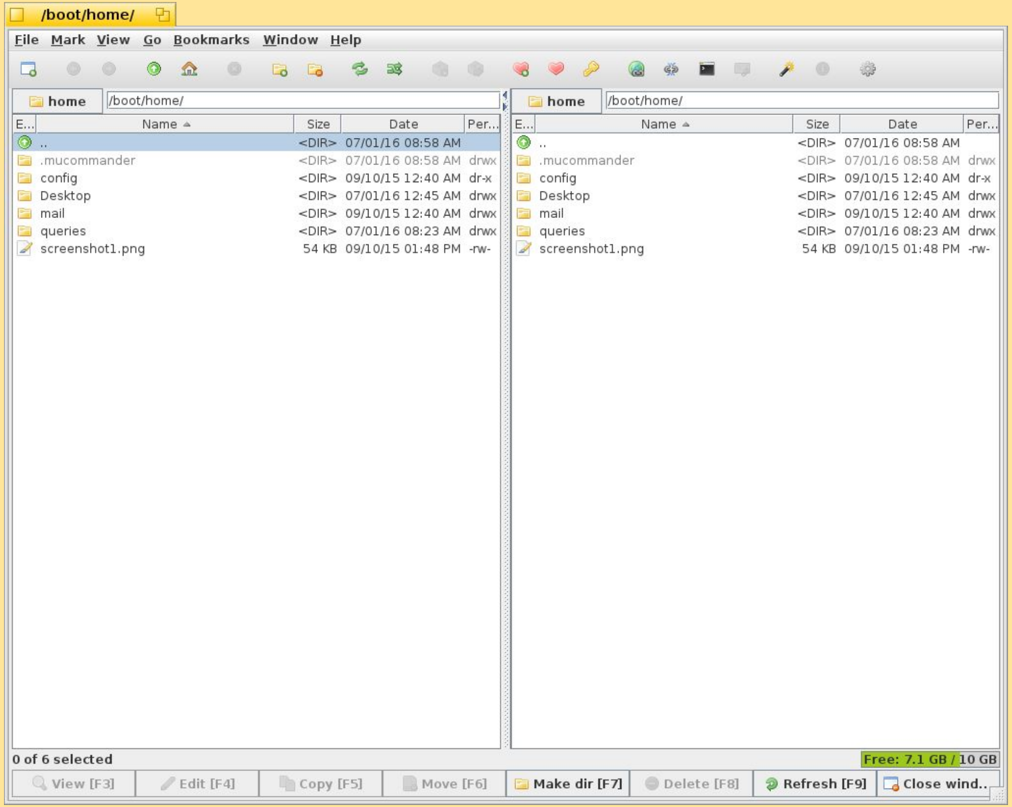
Apple icon translator
Version 1.0.0, Jun 30 2016
©2005-2006 Haiku Inc.
©2012 Gerasim Troeglazov <3dEyes@gmail.com>.

Valid sizes: 16, 32, 48, 128, 256, 512, 1024
Valid colors: RGB32, RGBA32

libicns v0.8.1
2001-2012 Mathew Eis <mathew@eisbox.net>

Java

- OpenJDK 7
- OpenJDK 8
- Eclipse doesn’t work
  - SWT requires Java API bindings
- NetBeans works - kind of…
  - Starts only the first time



E...	Name	Size	Date	Per...
	..	<DIR>	07/01/16 08:58 AM	
	.mucommander	<DIR>	07/01/16 08:58 AM	drwx
	config	<DIR>	09/10/15 12:40 AM	dr-x
	Desktop	<DIR>	07/01/16 12:45 AM	drwx
	mail	<DIR>	09/10/15 12:40 AM	drwx
	queries	<DIR>	07/01/16 08:23 AM	drwx
	screenshot1.png	54 KB	09/10/15 01:48 PM	-rw-

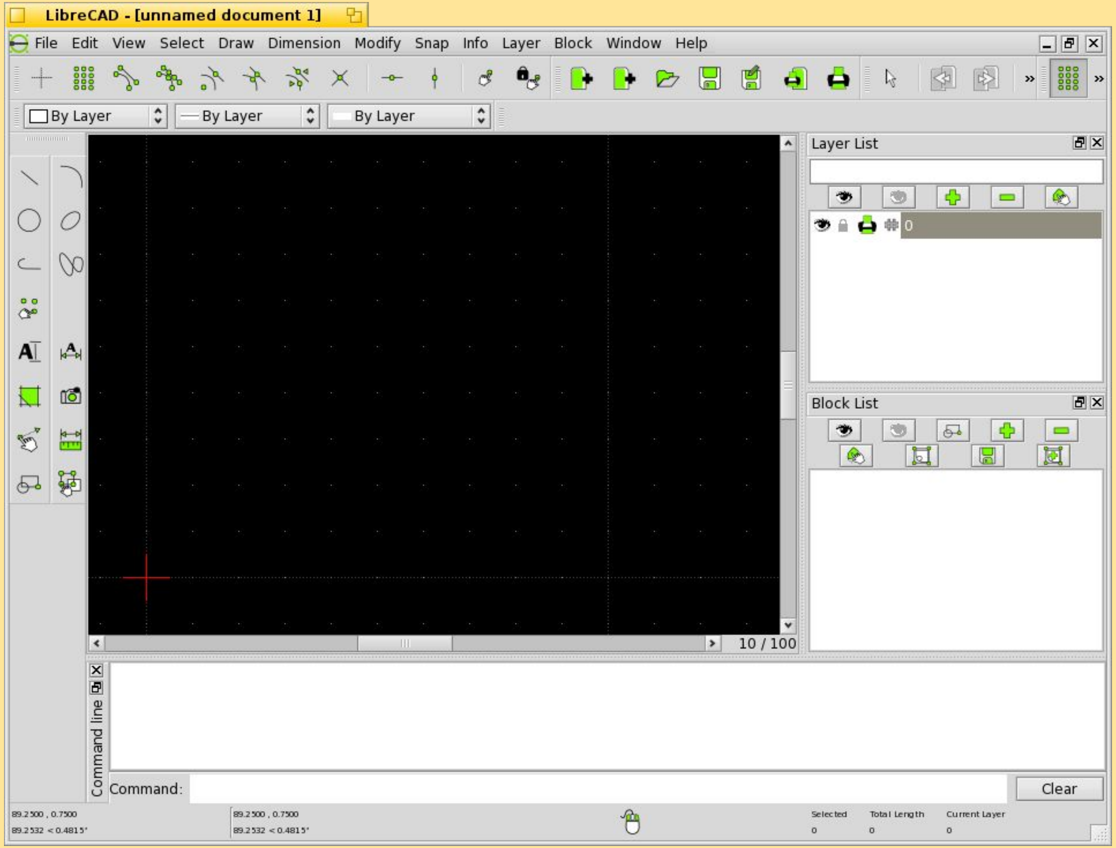
E...	Name	Size	Date	Per...
	..	<DIR>	07/01/16 08:58 AM	
	.mucommander	<DIR>	07/01/16 08:58 AM	drwx
	config	<DIR>	09/10/15 12:40 AM	dr-x
	Desktop	<DIR>	07/01/16 12:45 AM	drwx
	mail	<DIR>	09/10/15 12:40 AM	drwx
	queries	<DIR>	07/01/16 08:23 AM	drwx
	screenshot1.png	54 KB	09/10/15 01:48 PM	-rw-

0 of 6 selected

Free: 7.1 GB / 10 GB

Qt

- Qt 4
  - put together to “just work”
- Qt 5
  - upstreamed



Contributing

- Haiku
  - Trac for issue tracking
  - Patches attached to issues
  - Code review happens on ML after committing
- HaikuPorts
  - GitHub’s pull request workflow

Porter

- POSIX compatibility
- Ports system
- Sample recipe

Ports system

- HaikuPorter
    - Written in Python 2
    - Emits warnings in case of misplaced files
    - Features build master mode
    - Builds packages in `chroot`-ed environment
- Currently just one master branch
- Patches stored in one .patchset file
    - HaikuPorter creates a git repository for the extracted sources
    - Retains commit history
    - HaikuPorter can automatically extract them from changes
- Follows Gentoo Portage’s directory structure

Sample recipe

```
SUMMARY="Short description of ProjectX"
DESCRIPTION="Long ProjectX description."
HOMEPAGE="https://homepage/of/projectx.org"
COPYRIGHT="2014 Developer name"
LICENSE="MIT"
REVISION="1"
SOURCE_URI="https://example.com/projectx-$portVersion.tar.gz"
CHECKSUM_SHA256="000000000000000000000000000000000"
SOURCE_DIR="$portVersionedName"
PATCHES="projectx-$portVersion.patchset"
ADDITIONAL_FILES="projectx.rdef"

ARCHITECTURES="x86_gcc2 ?x86 ?x86_64"
SECONDARY_ARCHITECTURES="?x86"
```

Sample recipe

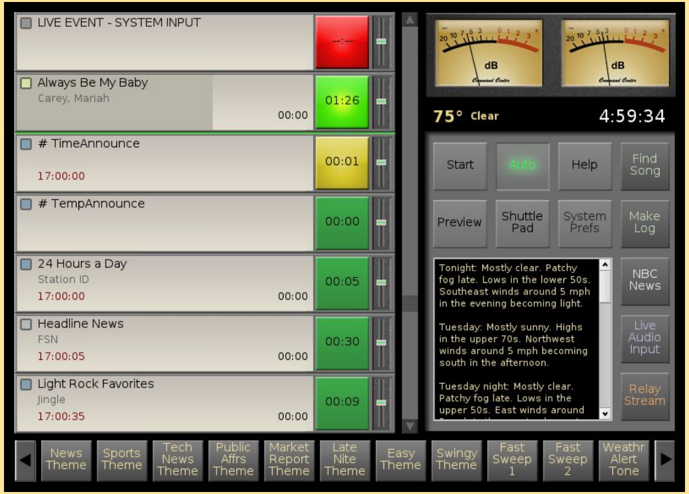
```
PROVIDES="
      projectx$secondaryArchSuffix = $portVersion
      lib:projectx$secondaryArchSuffix = $portVersion
      "
REQUIRES="
      haiku
      "
PROVIDES_devel="
      projectx${secondaryArchSuffix}_devel = $portVersion
      devel:libprojectx$secondaryArchSuffix = $portVersion
      "
REQUIRES_devel="
      haiku${secondaryArchSuffix}_devel
      projectx$secondaryArchSuffix == $portVersion base
      "
BUILD_REQUIRES="
      haiku_devel
      "
BUILD_PREREQUIRES="
      makefile_engine
      cmd:make
      cmd:gcc
      "
```

Sample recipe

```
BUILD()
{
      make $jobArgs OBJ_DIR=objects
}

INSTALL()
{
      mkdir -p $libDir
      mkdir -p $includeDir

      cp -a objects/libprojectx.so $libDir
      cp -R include/. $includeDir

      prepareInstalledDevelLibs libprojectx
      packageEntries devel $developDir
}

TEST()
{
      make check
}
```

Miscellaneous

- FreeBSD network compatibility layer
  - Lets us use FreeBSD drivers without changes
  - Currently from FreeBSD 9
- No graphics drivers for modern video cards ;(
  - W~~IP~~ Gallium3D port
  - Mesa swrast & softpipe
- Who cares?
  - TuneTracker Systems
  - University of Auckland



LIVE EVENT - SYSTEM INPUT --:--

Always Be My Baby
Carey, Mariah
00:00 01:26

TimeAnnounce
17:00:00 00:01

TempAnnounce
00:00

24 Hours a Day
Station ID
17:00:00 00:00 00:05

Headline News
FSN
17:00:05 00:00 00:30

Light Rock Favorites
Jingle
17:00:35 00:00 00:09

75° Clear 4:59:34

Tonight: Mostly clear. Patchy fog late. Lows in the lower 50s. Southeast winds around 5 mph in the evening becoming light.

Tuesday: Mostly sunny. Highs in the upper 70s. Northwest winds around 5 mph becoming south in the afternoon.

Tuesday night: Mostly clear. Patchy fog late. Lows in the upper 50s. East winds around

Thanks for listening!

Questions?

WWW: https://haiku-os.org
IRC: #haiku on FreeNode

https://github.com/haikuports