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Open Source Convention

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# Better Living Through OpenJDK

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# Welcome!

- ▶ This talk will be about OpenJDK and the community building around it
- ▶ The road to OpenJDK
- ▶ GNU Classpath and friends
- ▶ The role of distributions
- ▶ OpenJDK
- ▶ Year Zero : Getting the code out there
- ▶ Year One : Cleaning stuff up
- ▶ This Year : OpenJDK and friends
- ▶ IcedTea, IcePick, BrandWeg
- ▶ SoyLatte and the BSD ports

# The Road To OpenJDK

- ▶ Jun 1996 : Work on gcj begins
- ▶ Nov 1996 : Work on Kaffe begins
- ▶ Feb 1998 : First GNU Classpath release
- ▶ Mar 2000 : GNU Classpath and gcj merge
- ▶ Dec 2002 : Eclipse running on GNU Classpath
- ▶ Oct 2003 : GNU Classpath and Kaffe merge
- ▶ Feb 2004 : First Java Libre FOSDEM track
- ▶ Apr 2004 : Richard Stallman writes about the 'Java trap'
- ▶ Jan 2005 : OpenOffice.org starts using gcj
- ▶ May 2005 : Work on Apache Harmony begins

# The Other Road To OpenJDK

- ▶ Jun 1995 : First Java One, JDK 1.0 released
- ▶ Feb 1997 : JDK 1.1 released under BCL
- ▶ Dec 1998 : J2SE 1.2 released under BCL
- ▶ Feb 1999 : J2SE 1.2 available under SCSL
- ▶ May 2000 : J2SE 1.3 released under BCL and SCSL
- ▶ Feb 2002 : J2SE 1.4 released under BCL and SCSL
- ▶ Sep 2004 : J2SE 5.0 released under BCL and SCSL
- ▶ Mar 2005 : J2SE 5.0 available under JRL, JLD, JIUL
- ▶ Jun 2005 : J2EE RI goes Open Source under CDDL
- ▶ May 2006 : J2SE 5.0 available under DLJ

# The Common Road

- ▶ May 2006 : Sun announces Java will be open source
- ▶ Nov 2006 : Java ME RI released as PhoneME under GPLv2
- ▶ Nov 2006 : Java SE Hotspot JVM and javac released under GPLv2
- ▶ May 2007 : The great rest of Java SE RI follow under GPLv2 (+ CP E)
- ▶ Jun 2007 : IcedTea project created
- ▶ Aug 2007 : OpenJDK TCK license
- ▶ Feb 2008 : OpenJDK 6 project created
- ▶ Jun 2008 : Fedora OpenJDK 6 build on x86 and x86\_64 passes TCK
- ▶ Jul 2008 : OpenJDK 6 in Debian main
- ▶ You are here. The code is on <http://OpenJDK.java.net>

# GNU Classpath And Friends

- ▶ Virtual machines are fun to hack on
- ▶ But then you also need a class library to get anything useful done
- ▶ Many Free Software virtual machines out there
- ▶ Kaffe, gcj, Cacao, JamVM, IKVM, JikesRVM, Jnode, Myna, ...
- ▶ Use the class library as the backbone for the Free Software world
- ▶ Build a diverse developer and runtime community around the project
- ▶ Different technologies (interpreters, jits, AOT, cross-compilers, ...)
- ▶ Different licenses (GPL, LGPL, zlib, CPL, ...)
- ▶ Different niches
- ▶ Inclusive, friendly, open collaborative community

# GNU Classpath and friends



# The Role Of Distributions

- ▶ GNU Classpath reached out to GNU/Linux distributions early
- ▶ Freedom as a core value
- ▶ Cambrian explosion of Free Software written in Java
- ▶ Involved with upstream Free Software projects in their packaging
- ▶ Fedora, Debian, Ubuntu, Gentoo, JPackage, OpenSuse, ...
- ▶ Created and nurtured demand for a fully Free Software Java stack
- ▶ Prepared the field for OpenJDK
- ▶ Showed that Open Source Java matters

# OpenJDK

- ▶ Free Software released under GPLv2 (+ Classpath exception)
- ▶ Follows the standard GNU Classpath licensing model
- ▶ No proprietary forks
- ▶ Improvements remain in the community
- ▶ Programs running on top of it can use any license
- ▶ Solves the ‘where is my fully compatible, up-to-date JVM’ problem
- ▶ Allows a fully Free Software Java stack to become part of distributions
- ▶ Fast adoption among peers and distributors
- ▶ Gradually replacing gcj as the default runtime in distributions
- ▶ Allows more Free Software written in Java to follow into ‘main’

# Year Zero : Getting The Code Out

- ▶ The Open Source announcement took a lot of people by surprise
- ▶ Including me
- ▶ The JDK contains a lot of code, including code from third parties
- ▶ From looking at efforts like OpenSolaris, it was clear it would take time
- ▶ Release the crown jewels first to show you're serious
- ▶ Hotspot and javac released first, after six months
- ▶ Licensing model picked
- ▶ The rest of the code followed within the next six months
- ▶ But 4 % of it couldn't be released as Free Software then – binary blobs
- ▶ Encumbrances

# Year One : Cleaning Stuff Up

- ▶ Encumbrances in six major areas
- ▶ Font rasterizer
- ▶ Graphics rasterizer
- ▶ Sound engine
- ▶ Crypto providers
- ▶ Imaging APIs
- ▶ Some SNMP code (not part of the platform spec)
- ▶ Two pronged strategy
- ▶ IcedTea project created using existing code from GNU Classpath
- ▶ Sun negotiated/reimplemented/got lucky

# Year One : Cleaning Stuff Up

- ▶ Encumbrances are now gone, save SNMP
- ▶ SNMP not part of the platform spec, though
- ▶ So you can certify OpenJDK now as fully compatible to Java 6
- ▶ OpenJDK 6 project
- ▶ Stable, high-quality and certifiably compatible as Java 6
- ▶ Foundation for distributions to package other Java-based software
- ▶ OpenJDK Community TCK License Agreement
- ▶ Gratis for GPLv2 Java 6 projects substantially based on OpenJDK
- ▶ OpenJDK trademark license
- ▶ Allows packages to use OpenJDK trademark, follows the code

# This Year : OpenJDK And Friends

- ▶ Encumbrances are now gone
- ▶ Sound engine implemented by the community as Gervill
- ▶ Cryptography classes released by Sun
- ▶ Font rasterizer replaced by FreeType
- ▶ Graphics rasterizer replaced by renderer from PhoneME
- ▶ Native color management replaced by LittleCMS
- ▶ All gone ... except a small bit of SNMP
- ▶ SNMP not part of the platform spec, though
- ▶ So you can certify OpenJDK now as fully compatible to Java 6

# OpenJDK 6

- ▶ Stable, high-quality and certifiably compatible as Java 6
- ▶ Foundation for distributions to package other Java-based software
- ▶ OpenJDK Community TCK License Agreement
- ▶ Gratis for GPLv2 Java 6 projects substantially based on OpenJDK
- ▶ OpenJDK trademark license
- ▶ Allows packages to use OpenJDK trademark, follows the code

# OpenJDK And Friends



# IcedTea

- ▶ Bootstrap OpenJDK using Free Software exclusively
- ▶ Configure script, basic automake support
- ▶ Build using gcj, ecj and GNU Classpath
- ▶ Plug the holes left by encumbrances with code from GNU Classpath
- ▶ Provide a staging ground for GNU/Linux patches going into OpenJDK
- ▶ Applet viewer & Web Start through gcjwebplugin & Netx
- ▶ On x86\_64-linux, too
- ▶ Zero : Hotspot interpreter on top of libffi
- ▶ Shark : Hotspot jit on top of LLVM
- ▶ Sparc-linux

# IcedTea

- ▶ Collaboration point for getting OpenJDK into distributions
- ▶ Fedora / RHEL / CentOS
- ▶ Ubuntu
- ▶ Debian main
- ▶ OpenSuse
- ▶ ArkLinux
- ▶ Gentoo

# IcePick

- ▶ Separate build of OpenJDK language tools
- ▶ Javac, Javah, Javap, Javadoc, apt
- ▶ Alternative to ecj
- ▶ Alternative to existing GNU Classpath tools
- ▶ Better javadoc support than gcjdoc
- ▶ Standard, well tested compiler & tools
- ▶ There is no alternative Free Software implementation of apt
- ▶ Builds and runs on top of any GNU Classpath runtime
- ▶ Solves bootstrapping issues
- ▶ Used by JikesRVM

# BrandWeg

- ▶ Experimental project
- ▶ Complements IcedTea : Adds OpenJDK elements to GNU Classpath
- ▶ Build script & patches for hybrid Classpath/OpenJDK class libraries
- ▶ Make it easy for existing GNU Classpath runtimes to use code from OpenJDK class library without having to implement its VM interface
- ▶ More runtimes, more choices, more platforms

# Common VM Interface

- ▶ GNU Classpath has a well-defined, documented VM interface
- ▶ Allows many different runtimes with different needs to plug in
- ▶ Apply lessons learned from GNU Classpath to OpenJDK
- ▶ Document the Hotspot VM interface
- ▶ Avoid duplication of effort as GNU Classpath runtimes switch
- ▶ Lower the barrier for reuse of OpenJDK class library
- ▶ OpenJDK Challenge project
- ▶ Andrew Hughes

# CACAO

- ▶ Research VM from Vienna University of Technology
- ▶ Small, portable JIT (alpha, arm, mips, powerpc, s390, x86, x86\_64)
- ▶ Vmgen interpreter
- ▶ GNU GPL
- ▶ Uses GNU Classpath as class library
- ▶ Can use PhoneME (CLDC 1.1) as class library
- ▶ Can use OpenJDK as class library

# IKVM.NET

- ▶ Written in C#
- ▶ Runs on top of Mono and .NET
- ▶ Cross-compile bytecode just-in-time to CIL
- ▶ Uses OpenJDK as its class library

# BSD porters & SoyLatte

- ▶ There is a porters group in OpenJDK
- ▶ Haiku, mips-linux
- ▶ There is an existing, compatible port to FreeBSD: Diablo
- ▶ Based on code released under SCSL & JRL
- ▶ Bootstrapping is painful
- ▶ \*BSD is open source, OpenJDK is open source
- ▶ Mac OS X is kind of BSD-ish
- ▶ SoyLatte is a patchset for Mac OS X 10.4, 10.5 on x86, x86\_64
- ▶ X11
- ▶ Had to work out a way to bring the port into OpenJDK as SCSL/JRL & GPL don't mix – done now

# Other OpenJDK Projects

- ▶ Modules
- ▶ Multi-language VM
- ▶ New I/O
- ▶ Type Annotations
- ▶ Visual VM
- ▶ Caciocavallo
- ▶ Xrender Pipeline
- ▶ Compiler Grammar
- ▶ Framebuffer toolkit

# This year

- ▶ More infrastructure (bug DB, code reviews, opengrok, wiki, ...)
- ▶ Push more of the processes and tools out
- ▶ Grow the community (projects, committers, platforms)
- ▶ Governance
- ▶ Encourage more software written in Java to be packaged for distributions, profiting from OpenJDK 6 being everywhere
- ▶ Apt-gettable fully free software Java stacks
- ▶ NetBeans & Glassfish already in Ubuntu
- ▶ Better life for Java developers on Linux, \*BSD, and everywhere else

# Thank you!

- ▶ <http://OpenJDK.java.net>
- ▶ Developer guide for getting started
- ▶ Mercurial with the forest extension
- ▶ Mailing list : [discuss@openjdk.java.net](mailto:discuss@openjdk.java.net)
- ▶ IRC : *#openjdk* on OFTC
- ▶ Sun booth: Wed, 11:30 More OpenJDK Q&A
- ▶ Sun booth: Thu, 1:30 Java Packaging : Life after OpenJDK
- ▶ [Dalibor.Topic@sun.com](mailto:Dalibor.Topic@sun.com)
- ▶ See you at FOSDEM!