Gnome Project.

Bring Linux to the desktop.

- Started in 1997
- Fill the gaps on the desktop offering.
- Raising the programming level:
  - Component-based software.
  - Raise programming level: language bindings.

Technically:

- C-based APIs, contracts to bind it.
- CORBA used for exposing components APIs.
- Far from perfect solutions.
- Bindings came out of schedule.
The Ximian Background.

Ximian: focused on making Linux succeed on Desktop.

Evolution: our large application
- Standards compliant, best email/calendar/address.
- Complex: multi-threaded, multi-process
- Too many standards.
- Innovation was hard
- At peak for 1.0: 17 developers, 2.5 years Too Expensive.

We needed better tools.
Unix: Everyone Building its Own Platform
Late 2000: .NET Framework Beta.

The .NET Framework had:

• Garbage collection.
• New high-level language.
• Multi-language support
• Specifications were released.

Exactly what we were looking for

• But only available on Windows!
But what is .NET?

New application development framework from Microsoft
- Spawns across all of Microsoft's offering, umbrella marketing

.NET Applications:
- Usually built in VS.NET on Windows
- Runs on the .NET VM (compiled to MSIL)
- Uses the .NET core libraries
- Might use a language runtime
- Might make calls to different APIs (System.Windows.Forms, ADO.NET, XML, …)
- Might make native calls (Platform Invokes)
- May use third party controls
- Console, GUI (SWF, GTK#, VxWorks, …), or Web applications and also Web Services
What can I do with it?

Next Generation Development Platform:

• High Level Programming.
• From Microsoft.
• Core standardized by ECMA/ISO.

Comprehensive:

• GUI applications.
• Console applications.
• Server applications.
• Transactional
• Web Services
• Web-apps.
What is Mono?

A complete and modern development platform for Linux and an Open Source implementation of .NET

- Cross platform:
  - Unix family: Linux, MacOS X, Solaris, HP-UX, AIX.
  - Windows family: 2000, NT, XP.
  - Embedded systems (tiny profile).
- Open Source compilers and tools:
  - Today: C# language, Java, Nemerle.
  - Preview: VB.NET, Jscript, Python.

Increase developer productivity

- Most modern tools available today.

Ease transition from Windows to Linux development
Developer Platform Tolerance

More Developers

Core Developers

Students and Linux Developers

ISV Developers

IT Developers

Less Bathing

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Multi-language and multi-platform.

- C#
- Fortran
- Eiffel
- C++
- JavaScript
- Visual Basic
- Java
- Cobol

Common Intermediate Language

- Code Generation: Just-In-Time or Ahead-of-Time
  - x86
  - SPARC
  - StrongARM
  - s390
  - PowerPC
What is Mono?

Mono Runtime
(Implementation of ECMA #335)

Microsoft Compatibility Libraries
- ASP.NET
- ADO.NET
- Windows Form

Mono Libraries
- MySQL/Postgres
- Evolution#
- Mozilla
- Novell iFolder
- Apache Mono
- GTK#
- Novell LDAP
- Gnome#
- Java Compatibility
- ZipLib
- Microsoft Compatibility Libraries
- Mono Libraries
What is Mono?

Open source effort sponsored by Novell
Implementation of the .NET development framework
Includes:

- C# compiler
- CLR (.NET Virtual Machine)
- Set of APIs (.NET and Linux/Gnome bindings)
- ADO.NET & ASP.NET for web application and web services development
- Embedding API (Perl, C, C++, ...)
- And more... (Java, VB.NET, ...)
Reuse.

Existing .NET:
- Third party components written in C#, VB.
- Third party compilers.

Java:
- Seemless integration of Java libraries and applications.
- Execute C# and Java code side-by-side
- Share components, expose components.
- The IKVM Virtual Machine.

The Ultimate Open Source Reuse.
.NET, .NET or .NET?

ECMA
.NET, .NET or .NET?

.NET 1.1
.NET, .NET or .NET?

.NET Universe

Microsoft Software Ecosystem
Novell Software Ecosystem

Most components are O.S.S.
Server side: ASP.NET

Most people want to run ASP.NET

- Works-with and Powered-by.
Desktop Development.

Leverage features of Unix, Linux, Gnome.

Gtk# -- Replacement for Windows.Forms:
  • Constraint-based dialogs
    - Internationalization.
  • Accessible (508(c) compliant).

Mozilla integration (gecko-sharp, XPCOM#).

Graphics:
  • OpenGL, Glitz
  • Cairo, SVG (2D API)
Desktop Development.

System.Windows.Forms (SWF)
  • 100% managed implementation based on X11 libs
  • to be delivered in Feb 2005
  • Very important, needs some love

Cocoa#
  • Native GUI API for MacOS X
  • Early Stages
  • also includes ObjC#
```csharp
public class GladeApp
{
    public static void Main(string[] args)
    {
        new GladeApp(args);
    }

    public GladeApp(string[] args)
    {
        Application.Init();
        Glade.XML gtkml = new Glade.XML(null, "gui.glade", "window1", null);
        gtkml.Autoconnect(this);
        Application.Run();
    }

    // Connect the Signals defined in Glade
    public void onWindowDeleteEvent(object o, DeleteEventArgs args)
    {
        Application.Quit();
        args.RetVal = true;
    }
}
```
IDEs

MonoDevelop

- http://www.monodevelop.com

Eclipse

Emacs, VIM, ...

VisualStudio.NET
Migration
What applications?

Desktop Applications
- Office Suite, IM, Internet Browsing, e-mail
- Web Applications (client, IE specific ?)
- Rich Client Applications
- Utilities

Server Applications
- Web Applications (server)
- Web Services
- Databases
- ...
Rich Client Applications (1/2)

Win32 applications / MFC
- C, C++ (Visual C, C++)
- VB6
- PowerBuilder
- Delphi

Solutions:
- Wine / CrossOver (Win32 emulation)
- VMWare, Bosch (Windows+x86 emulation)
- Remote execution (Terminal Services, RDP, Citrix, VNC)
Rich Client Applications (2/2)

Java Applications
Build once, run anywhere!
But no so much on the Desktop...

.NET Applications
- VB.NET
- C#
- Managed C++, C++/CLI
- Delphi.NET
- Others (Cobol.NET, Fortran.NET, ...)

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Server Applications

Web Applications, Web Services, Remoting services

- J2EE application
- PHP, Python, Ruby (Rare on Windows)
- ASP.NET applications (System.Web.Forms and Services)
- ASP applications (not ASP.NET)
  - Old Microsoft web application technology
  - VBScript/Jscript
  - Mix of HTML and code
  - No RAD tools
  - Painful
- COM, COM+, CORBA, ...
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.NET binaries and Mono

Mono is binary compatible with Microsoft .NET

- runs .NET .exe and DLLs
- but only .NET ones, not win32 ones
- You can re-compile with mcs but you don't need to
- What you'll find in your Mono directory:
  - .exe files (*mono application.exe*)
  - .dll files
  - Shared libraries
  - Mapping files
- Mono includes GAC (Global Assembly Cache) support
  - Protection from DLL-Hell
Mono 1.0 includes a C# 1.0 compiler and C# 2.1 extensions (generics in beta)

Mono 2.0 will include a C# 2.1 compiler

Current CVS includes generics and anonymous method support.

C# is the language of choice even though the CLR is multi-language

• Are you sure?
VB.NET

VB.NET compiler and runtime in current CVS
Final release with Mono 1.2 (Feb 2005)
Can run ASP.NET pages since August 2004

Key to migration efforts

Perception: Most VB6 developers are adopting VB.NET
  • Reality?
ADO.NET & Databases

Regardless of what it does, your application is likely to make DB access Complete implementation of ADO.NET in Mono 1.0 Includes data providers for Oracle, MS-SQL Server, MySQL, Progress...

Possible to migrate from MS-SQL to MySQL (for example) but not necessary

- Migration Applications (MSSQL-to-MySQL)
- Migration guides
  http://dev.mysql.com/tech-resources/articles/migrating-from-microsoft.html

Also available, Gda# & GnomeDB#

Data access via Soap/Web (then use System.Web.Services and System.XML) or Remoting
System.Windows.Forms

Mono 1.2 (Feb 2005) will include SWF compatibility

Essential to seamless migration of classics Windows .NET GUI applications

What of Gtk#?
Gtk#

Set of .NET bindings for the gtk+toolkit and assorted GNOME libraries

 Allows you to build fully native Gnome application using Mono and includes support for user interfaces built with the Glade interface builder.

 Cross platform (Linux, Windows, MacOS X, Solaris, ...)

 True .NET API, not just a wrapper to C++ bindings

 System.Windows.Forms or Gtk# ?
Mono includes support for ASP.NET (Web Applications and Web Services)

- **XSP**
  - Standalone server
  - ASP.NET & static HTML only
  - Development time
  - Back-end for mod_mono

- **mod_mono**
  - Plugin for Apache (v1 & v2)
  - Uses Apache for all common web server tasks
  - Unix sockets communication
ASP.NET

Language support
- Most applications use VB.NET or C#
  - Need for a Code Provider for additional language support
- C# with Mono 1.0
- VB.NET with Mono 1.2 (February)

Pages compiled at runtime
- ASP.NET 2.0 includes Pre-compiled pages support

Careful of IIS specific programming outside of ASP.NET

Web Services, remoting, ...

Third Party controls
P/Invoke

Platform Invocation services: Native calls

Trivial to use

Unsafe Code, leaving the sandbox safety

Opportunity for platform inconsistencies

Does the native code you invoke in Windows exist in Linux?
Third Party controls

Business logic, GUI controls, Web Controls, Web Services, Statistics libraries, ...

Is it a pure .NET implementation or just a wrapping of native windows controls or code?

Is it a clean .NET application?

The Mono team is working with third party providers for Mono certification.
Mono for Windows ???

Now I am confused...

Mono has always been available for Windows

- Sanity Check
- Co-host with Microsoft .NET
- XSP
- GTK#/GTK+ for Windows
- VS.NET plugin, documentation, Gtk# development, ...
Enterprise Services

Provides the features of COM+ in .NET

- MTS
- IIS
- MSMQ

Not implemented in Mono

- Very rarely used
- Soon to be EOL by Indigo APIs
- Very dependent on Windows’ internals
Development Community
Mono Development Community.

Mono is an effort lead by Novell.

- 20 Engineers from Novell.
- 300 developers from the Open Source community.
- Benevolent Dictator: Miguel De Icaza

Like other open source efforts, other companies help:

- Embedded system vendors.
- Mainsoft
- SourceGear.

Reuse pieces of open source code:

- Intel's ORP research.
- SGI/HP's Boehm GC.
Mono Development Community.

*n different projects: makes it easy to contribute* (mostly C#, C)

- Compilers (C#, VB.NET, Nemerle, JavaScript, IronPython, …)
- Interpreters, JIT compilers (x86, Sparc V9/10, AMD64, PPC, PPC64, S390, S390X, ARM, Linux, MacOS, Windows, Solaris…)
- Virtual Machine
- IDEs (MonoDevelop, Eclipse, Visual Studio .NET)
- APIs (MS compatibility, Mono Exclusive, Third Party)
- Networking & Servers (Remoting, XSP, SOAP), Database access (ADO.NET)
- Native GUIs, Cross Platform GUIs (GTK#, SWF, Cocoa#, others)
- Demo applications, Regression Tests
- Installers, Packaging
- QA
- Docs
Mono Development Community.

Communication

- **IRC** (irc.gimp.net - #mono)
- Mailing Lists ([http://www.mono-project.com/about/mailing-lists.html](http://www.mono-project.com/about/mailing-lists.html))
- Web Site ([http://www.mono-project.com](http://www.mono-project.com) & others)
- Blogs ([http://www.go-mono.com/monologue](http://www.go-mono.com/monologue))
Mono Development Community.

Futures

• ARM
• .NET 2.0
  - XML 2.0
  - ASP.NET 2.0
  - ADO.NET 2.0
  - C# 2.1
• Longhorn
  - Avalon
  - WinFS
  - Indigo
• Mono Specific
  - GUI Builder for GTK#
  - Data binding
Driving Innovation in O.S.S.
Driving Innovation

By improving the developer's productivity on Linux, Mono is driving innovation on the Linux Desktop:

• Beagle/Dashboard
• Simias/iFolder 3.0
• f-spot
• TomBoy
• Desktop (i-print, RedCarpet, Virtual Office)

• Lots more at:
Mono in Real Life
Mono Success Stories

City of Munich: ASP.NET

• 350 servers, 150,000 users.

SourceGear: Vault Software 2.0

• Web Services Client to Microsoft .NET

MonoDevelop IDE

• Ported from Windows in record time.

Novell iFolder

• Cross platform development.

Lee County of Florida, SourceGear, Mainsoft, …

Mainsoft (MainWin for J2EE), Winfessor, Virtuoso (OpenLink).
Mono
Roadmap (calendar quarters)

Mono 1.0
- Open Source multi-platform .NET implementation
- Gtk# 1.0, Java IKVM
- Core tools (C# Compiler, Runtime, Debugger, MonoDoc)
- Supported deployment on Linux (PPC & x86), Windows and MacOS X
- Establishes parity with Microsoft .NET 1.1

Mono 1.2
- Implementation of Windows.Forms
- Preview of .NET 2.0 features:
  - ASP.NET 2.0 & XML 2.0
  - C# 2.0
- VB.NET 1.0
- GTK# updated for Gnome 2.6 APIs and data bindings support.

Mono 2.0
- Establishes parity with Microsoft .NET 2.0
  - ASP.NET 2.0
  - XML 2.0
  - C# 2.1
- Update of Mono Exclusive APIs
- Preview of select Longhorn features

Q1
- FCS Date
- Beta Date

June
- Q3
- FCS Date
- Beta Date

Jan
- FCS Date
- Beta Date
- Q3
- FCS Date
- Beta Date

Mar
- FCS Date
- Beta Date
- Q3
- FCS Date
- Beta Date

May
- FCS Date
- Beta Date
- Q3
- FCS Date
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Jul
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- Q3
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Sep
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Nov
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Dec
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Jan
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Feb
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Mar
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Apr
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May
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Jun
- Beta Date
- Q3
- Beta Date
- Q3
- Beta Date
Mono - A Developer’s Handbook

“All labs, no lectures”
O’Reilly Publishing
More Mono

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