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**IRIX<sup>®</sup> / Windows NT<sup>®</sup>**

**Interoperability**

***Hank Shiffman***

**Strategic Technologist**

**Silicon Graphics, Inc.**



# What is Interoperability?

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*Seamless exchange of information among users, programs and systems in a heterogeneous environment*

# Models of Interoperability



*Not one big issue; many small ones*

- **Networks**
  - Low level network protocols
  - File & printer sharing
- **Data**
  - Access to structured data
- **Applications**
  - Remote serving
  - Cross-platform development
- **Management**
  - System & network resources

# Network Connectivity Benefits



## *Centralized services have benefits*

- **Easier administration & management**
- **Reduced cost (printers, scanners)**
- **High availability**
- **High performance**
- **Scalability**
- **Backup**

# Network Connectivity Standards



## *File sharing? Let me count the ways...*

- **NFS: Sun<sup>®</sup> & most UNIX<sup>®</sup> systems**
- **SMB: Windows<sup>®</sup> For Workgroups**
  - CIFS just renamed SMB
- **IPX: Novell<sup>®</sup> NetWare<sup>®</sup>**
- **AppleTalk<sup>®</sup> : Apple<sup>®</sup> Macintosh<sup>®</sup>**

# Network Connectivity Solutions



## *Windows NT clients to IRIX servers*

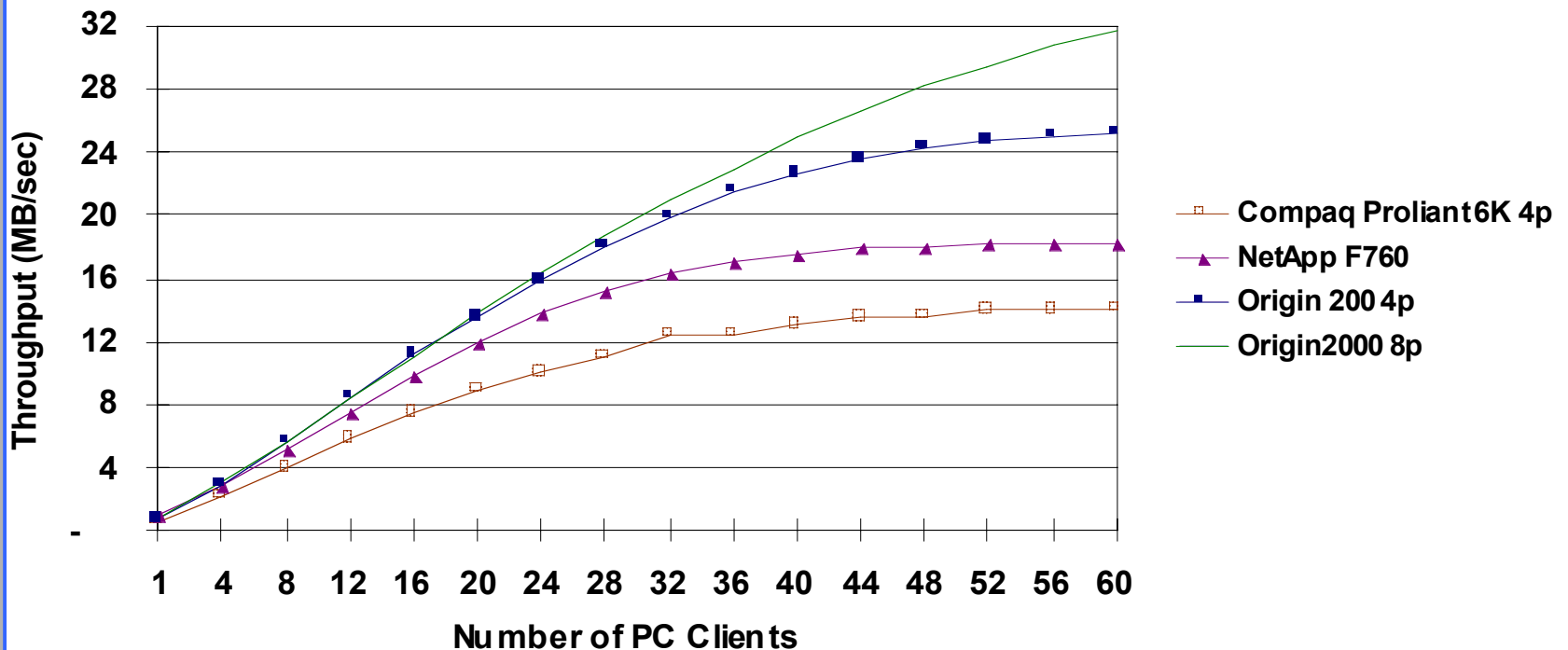
- **Hummingbird® NFS Maestro: PC client**  
<http://www.hummingbird.com/nc/nfs>
- **Syntax TotalNET Advanced Server**
  - Includes SMB, NetWare & AppleTalk protocols  
<http://www.syntax.com>
- **Samba: SMB server for UNIX (free)**
  - IRIX version available with full support  
<http://www.samba.org>

# Network Connectivity Solutions



## *Windows NT clients to IRIX servers*

- **Samba For IRIX: Top Performer**
  - Ziff Davis NetBench<sup>®</sup> 5.01 results



# Network Connectivity Solutions



## *IRIX clients to Windows NT servers*

- **Sharity**

  - <http://www.obdev.at/Products/Sharity.html>

- **Sharity-Light (formerly Rumba – free)**

  - <http://www.obdev.at/Products/shlight.html>

- **smbclient – ftp workalike for SMB**

  - Included with Samba



# Data Interoperability Issues

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- **Business data kept in servers; used in desktop applications**
- **Data more than just text: multimedia, images, controls**
- **Apps must access & control data wherever it resides**

# Distributed Object Issues



## *Big problems demand big solutions*

- **Complex client-server architectures**
  - Mix of UNIX & Windows NT clients & servers
- **Instantiation of objects is bidirectional**
  - No one is in control; everyone is in control
- **Existing standards must be supported**
  - Build on existing solutions

# Data Interoperability Standards

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- **ODBC: a standard database interface owned by the SQL Access Group**
- **CORBA: a standard for building large distributed object systems; owned by the Object Management Group**
- **(D)COM: Microsoft's standard for interfacing to objects, extended to support large distributed object applications**

# Data Interoperability Solutions



## *Database APIs*

- **Native interfaces provided by vendors**
  - Relational DBs: Oracle, Sybase, Informix
  - Object-oriented: Versant, Objectivity, ODI
- **ODBC drivers**
  - MERANT DataDirect SequeLink  
<http://www.merant.com/datadirect/products>
  - OpenLink Software  
<http://www.openlink.co.uk>

# Distributed Object Solutions



## ***CORBA***

- Iona Technologies Orbix  
<http://www.iona.com>
- Inprise (formerly Borland) Visibroker  
<http://www.inprise.com/visibroker>

## ***DCOM***

- Licensed by SGI from Microsoft
  - Native port in progress
  - Also available from Bristol & Mainsoft

# Application Availability



*Applications can be run and controlled from the local system; execution may occur on that system or on a remote application server*

# Application Availability Issues



*Remote access to interactive applications requires additional software*

*Development and porting of applications is difficult, due to differences in computing models*

# Application Serving Benefits



- **Centralized administration**
- **Much faster than emulation**
- **Easier learning curve**
- **Very good at running productivity software (e.g. Microsoft Office)**



# Application Serving Protocols



- **X Window System**
  - High bandwidth remote display protocol developed for UNIX systems
- **Independent Computing Architecture®**
  - Low bandwidth/high compression protocol invented by Citrix
- **T.share (T.128)**
  - Low bandwidth/high compression protocol invented by Microsoft
  - Originally used in NetMeeting product

# Application Serving Solutions



## *X Servers for PCs*

- **Hummingbird<sup>®</sup> Exceed<sup>®</sup>**
  - Exceed 3D provides OpenGL<sup>®</sup> serving  
<http://www.hummingbird.com/products/exceed>
- **WRQ Reflection Suite for X**  
<http://www.wrq.com>
- **NetManage Chameleon<sup>™</sup> UNIX<sup>®</sup> Link**  
<http://www.netmanage.com/products/unixlink>
- **MicroImages MI/X (free)**  
<http://www.microimages.com/freestuf/mix>

# Application Serving Solutions



## *Windows NT 3.51 server products*

- **Citrix WinFrame**

  - <http://www.citrix.com/products/winframe.asp>

- **NCD WinCenter**

  - <http://www.ncd.com/pwin/pwin.html>

- **Tektronix WinDD**

  - <http://www.tek.com/VND/>

- **Gone but not forgotten**

  - **Insignia Solutions NTrigue**
  - **Exodus Technologies NEnterprise**

# Application Serving Solutions



## *Windows NT 4.0 server products*

- **Microsoft® Windows NT® Server, Terminal Server Edition**
  - AKA Hydra
  - Only solution for Windows NT 4.0 and later
  - Uses RDP protocol (renamed from T.share)
- **Citrix MetaFrame**
  - RDP to ICA converter
  - Permits non-Windows systems to use Microsoft server

# Application Development Issues



## *UNIX & NT are very different systems*

- **Hardware issues**
  - Basic data types
  - Bit & byte ordering
  - Data alignment/packing
- **Software issues**
  - Pathnames & file system
  - Process & thread models
  - APIs & standards support

# Application Development & Portability



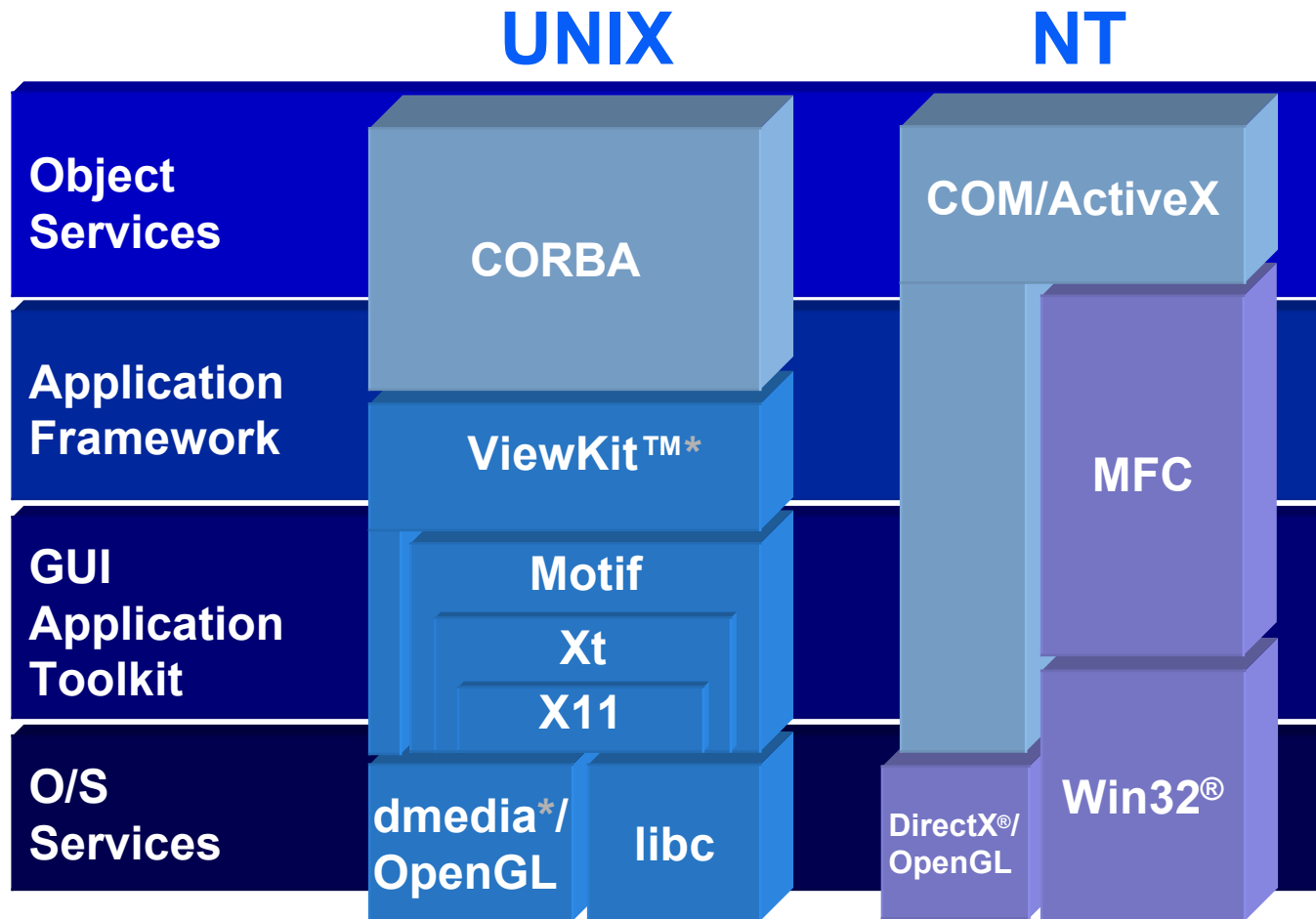
## *Three techniques for porting code*

- Rewrite using target's native APIs
- Use a porting library
  - Local APIs ported to target system
  - Portable API set (e.g. Java™)
- Emulation or binary translation

*Is app serving a better answer?*

# Application Development Compared

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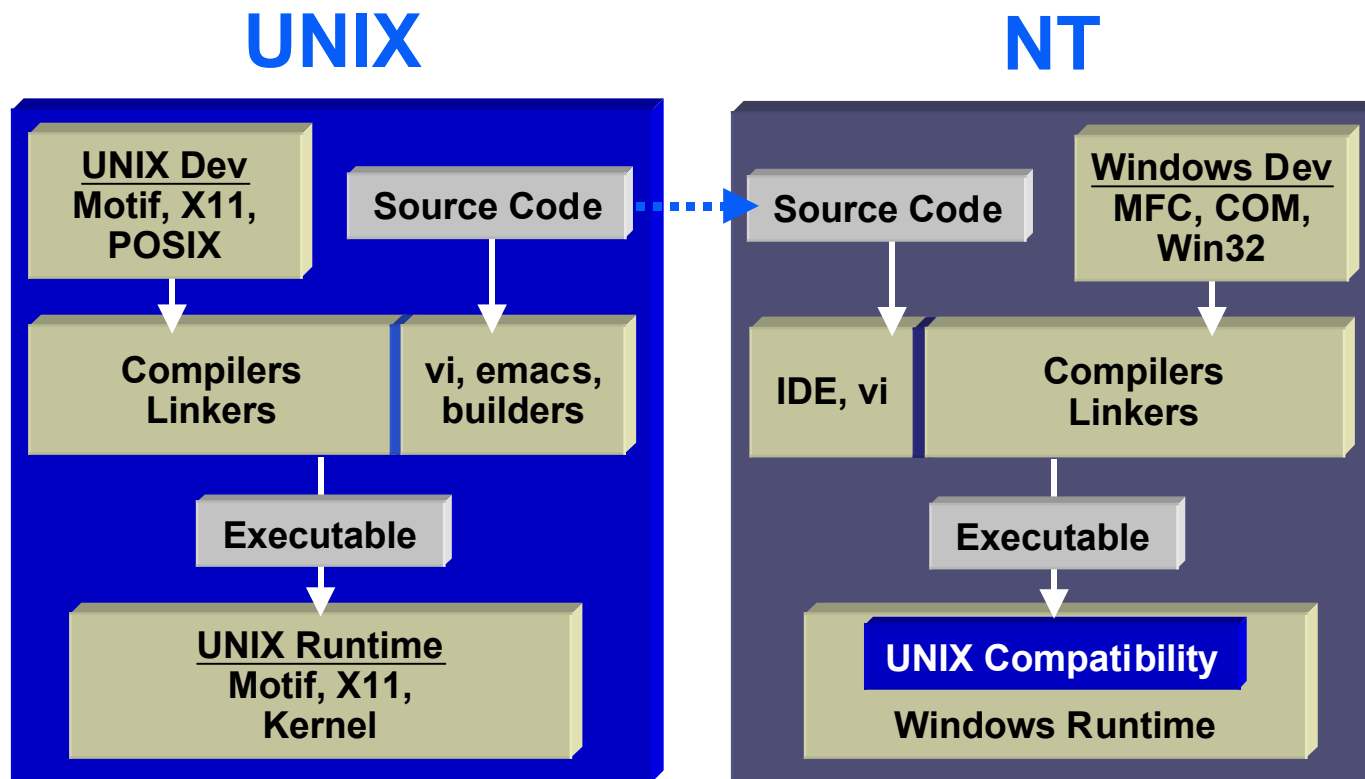


*\*IRIX-specific solution*

# Application Development Example

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## *Moving UNIX apps to NT*





# Application Development Solutions



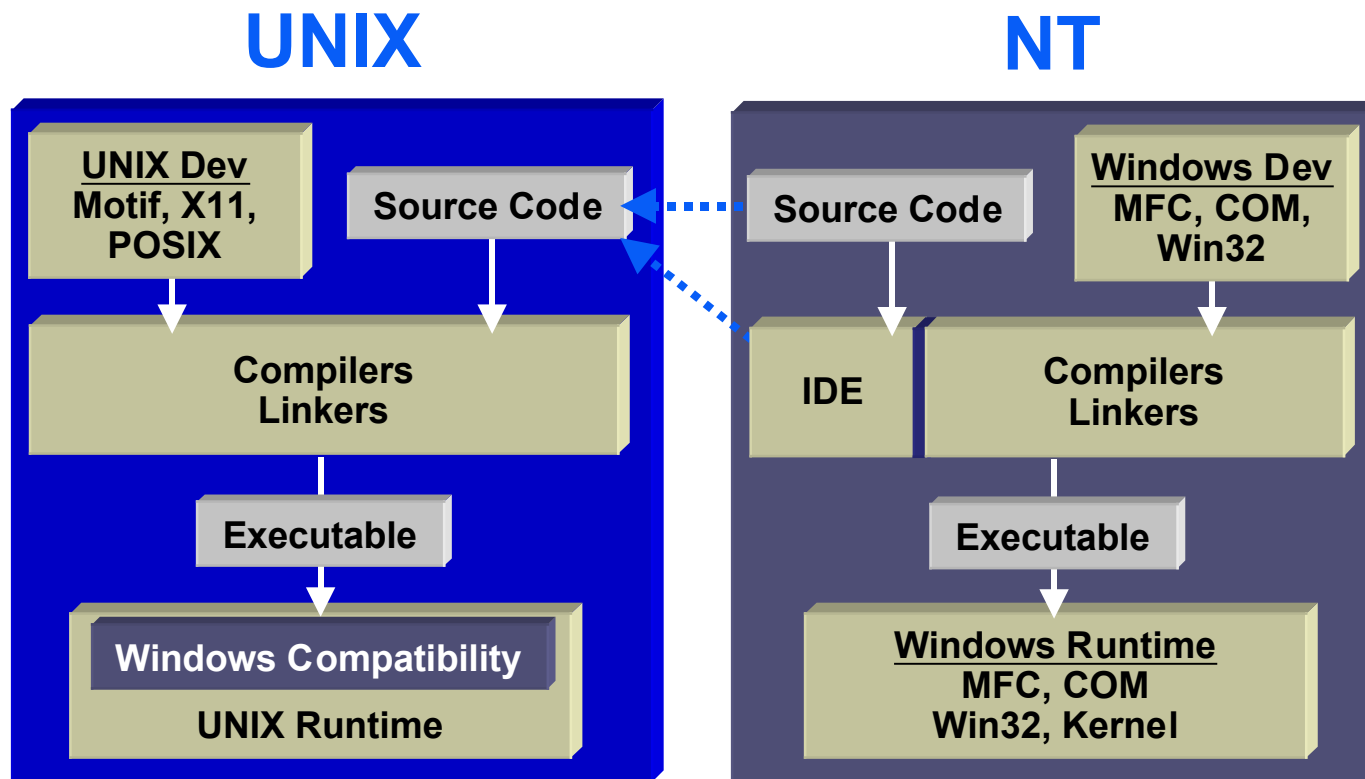
## *Moving UNIX apps to NT*

- **DataFocus NuTCRACKER®**
  - Now part of MKS  
<http://www.mks.com/solutions/nc>
- **Softway Systems Interix**
  - Formerly known as OpenNT  
<http://www.interix.com>
- **AT&T Research U/Win**
  - <http://www.research.att.com/sw/tools/uwin>  
- Global Technologies has commercial license  
<http://www.gtinc.com>

# Application Development Example

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## *Moving NT apps to UNIX*



# Application Development Solutions

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## *Moving NT apps to UNIX*

- **Mainsoft MainWin**  
<http://www.mainsoft.com>
- **Bristol Technologies Wind/U**  
<http://www.bristol.com>

# Application Development Solutions

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## *Porting packages reduce the effort*

- Many issues handled automatically
  - Pathname delimiters: / vs. \
  - Line delimiters: <CR><LF> vs. <NL>
  - Universal naming:  
iris:/usr/tmp vs. \\pc\C:\progs\source
- Some still require manual intervention
  - Compiler-generated symbols
  - Projects vs. Makefiles
    - commondefs & commonrules

# Application Development Experience



## *Port of Cosmo™ Code & Worlds to NT*

- **UNIX common defs, rules & cascading Makefiles well beyond Visual Studio**
- **Microsoft build environment has limited scalability**
- **No support for complex builds**

# Enterprise Management

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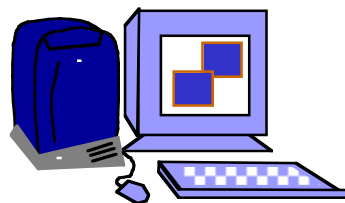
*Consistent and seamless management  
of systems and networks in a  
heterogeneous environment*

# Enterprise Management Solutions

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## *Classic client/server architecture*

- **Agents gather system & network data**
  - ENlighten DSM (included with IRIX 6.5)
  - HP-UX MIB (included with IRIX 6.5)
- **Managers give insight & control**
  - ENlighten DSM (part of IRIX 6.5.1 ASE)
  - Unicenter TNG (part of IRIX 6.5.1 ASE)
  - HP OpenView NNM



Server



Clients

# Completing The Picture: Windows NT Consulting Services



## *Customer Professional Services*

- **Architectural design**
  - Plan & implement network infrastructure
- **Implementation planning**
  - Includes sys admin & performance tuning
- **Porting**
  - UNIX app & device driver port to NT
- **Migration**
  - Convert IRIX development shop into IRIX/NT or NT-only environment





# Points To Remember

- **Interoperability isn't one big thing**
  - It's a million small details
- **Silicon Graphics knows the issues**
  - We grew up with heterogeneous networks
- **We're good at peaceful coexistence**
  - And we're determined to be even better

**Hank Shiffman**

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*<http://www.disordered.org>*