

Introduction to UDI

<http://www.sco.com/forum1999/conference/developfast/f6>

Kurt Gollhardt
SCO Core OS Architect
E-mail: kdg@sco.com



This is the first in a series of eight UDI presentations for SCO Forum 1999.

This session introduces the Uniform Driver Interface, the driver interface of the future, available today. UDI was created by Project UDI -- an open industry initiative -- to allow for 100% portability of device driver source across a wide range of Operating Systems and platforms. UDI isolates drivers from OS policies and platform details, allowing a driver to be moved to a new OS with at most a recompile.

Agenda

- **What and who are Project UDI?**
- Why portable drivers?
- Is it real?
- Related Activities
- Q & A



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What is UDI?

- **The Uniform Driver Interface**
 - Innovative new Device Driver Interface
 - OS-neutral and platform-neutral
- **Free and Open Specification**
 - Developed jointly by SCO and other Project UDI members
 - Downloadable from <http://www.sco.com/UDI>



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Key Features

- **Enables 100% driver source portability**
 - Defines architecture, APIs and packaging format
 - Supports source and binary distributions
- **Provides uniformity across device types**
 - Defines common execution model, inter-module communication and system services
 - Communication tailored to each device model
- ***Co-exists with legacy driver support***



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What is Project UDI?

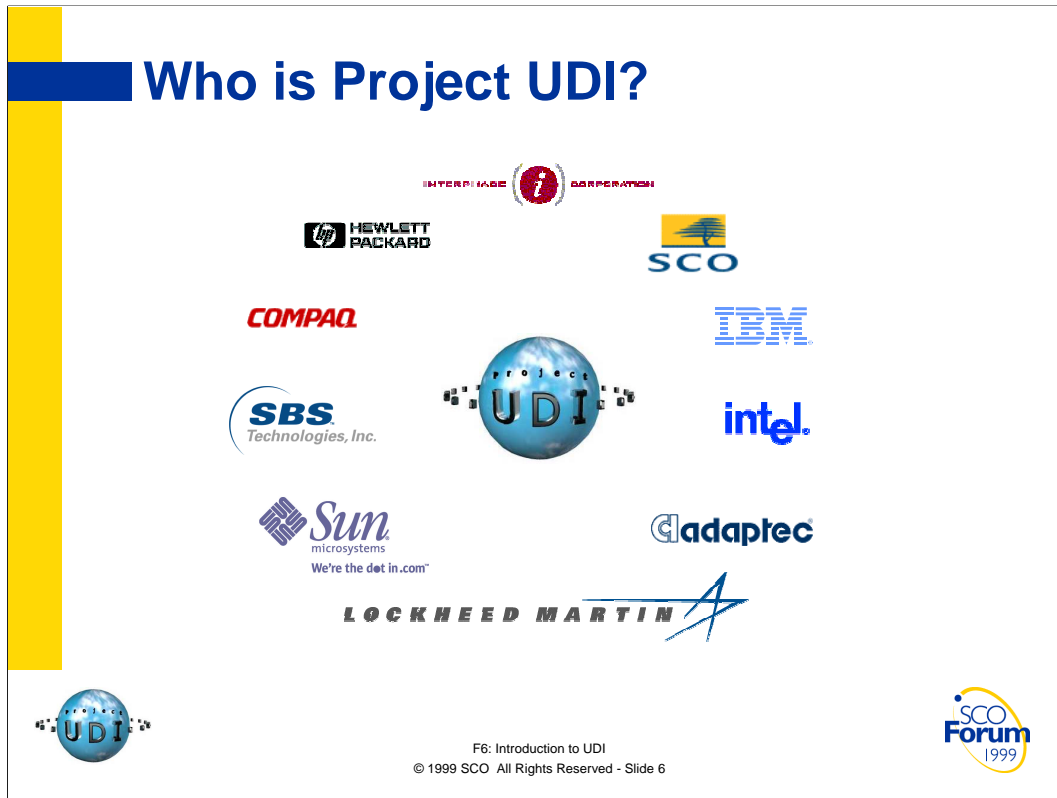
- **Open industry group since 1993**
 - Platform and OS vendors
 - IHVs
 - Solutions providers
- **Broad e-mail reflector community**
 - Subscribe via
<http://www.sco.com/UDI/reflectors.html>



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Who is Project UDI?



OS & Platform Vendors:

Compaq*, HP*, IBM*, SCO*, Sun*, Lynx Real-Time*

IHVs:

Adaptec*, SBS Technologies* (formerly Bit3*),

Interphase*

Others:

Intel*, Lockheed-Martin*

Latest list of participants at:

<http://www.sco.com/UDI/participants.html>

*All brands and names are the property of their respective owners.

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The “Driver Problem”

(IHV Perspective)

- **IHVs have huge matrix of drivers to develop/port**
 - # Devices × OSes × OS versions × platforms
- **Finite development & support resources**
 - Must choose porting order (target prioritization)
 - Some OSes and/or platforms not supported
- **Driver porting not core business**



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IHV core business:

Technology Innovation
Performance
Functionality

The “Driver Problem”

(Platform and OS Vendor Perspective)

- **Platform/OS vendors need IHV support**
 - Need broad device coverage to compete
 - Limited resources for driver development
 - Must leverage IHV partners
- **Dependent on IHV porting order**
 - Competitive advantage lost if too far down porting order
- **Driver porting not core business**



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Platform/OS Vendor core business:

Features and services

Enabling applications

RASS (Reliability, Availability, Serviceability, Scalability)

The “Driver Problem”

(Independent Timelines)

- OS and platform evolution not under IHV control
- IHV device evolution not under OSV control
- Independent development
- Requires stable, well-defined interfaces



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The UDI Solution

- **One driver source for all UDI-compliant OSeS**
 - UDI abstracts H/W and S/W environment
 - All driver interfaces completely specified
- **UDI moves up IHV porting order**
 - More bang for the buck for IHVs
- **UDI-compliant OSeS get better coverage**



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OSV Acceptance

- **Portability story not enough**
 - Must not be biased toward any OS or OSes
 - Must have good performance and scalability
 - Must support advanced features



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UDI: Next-Generation Technology

- **Instance independence**
 - Hot plug/hot swap adapters and devices
- **Location independence**
 - Distributed environments and I/O processors
 - User-mode drivers, advanced driver debugging tools, and validation environments



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UDI: Next-Generation Technology

(continued)

- **Single model for all device types**
 - “Mixed-model” FibreChannel*, USB*, etc.
- **Implicit MP synchronization**
 - No lock primitives
- **Support for field-installable 3rd-party extensions**
 - Adds new device models



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Informative Documents

- **Introductory Info**

- UDI FAQ & Data Sheet
- UDI Management & Technical Overviews
- UDI Marketing Information

- **Tutorial Materials In Progress**

- UDI Driver Writer's Guide
- UDI Environment Implementer's Guide



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These are useful introductory and tutorial materials, but do not contain any authoritative definitions or specifications.

Most are available from the "Intro to UDI" link on the UDI web page.

Normative Documents

- **Five Independent Specifications**
 - UDI Core Specification
 - UDI Physical I/O Specification
 - UDI PCI Bus Binding Specification
 - UDI SCSI Driver Specification
 - UDI Network Driver Specifications
- **More to come...**



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This is the initial set of UDI specs.

These are downloadable from <http://www.sco.com/UDI/specs.html>.

Core includes architecture, services, utility functions, Management and Generic I/O Metalanguages, and Packaging.

Physical I/O includes DMA, Programmed I/O (PIO), and Interrupts.

More bus bindings and driver specifications are on the way, including:

- UDI VME Bus Binding Specification
- UDI ISA/EISA Bus Binding Specification
- UDI System Bus Binding Specification (inc. ACPI)
- UDI Storage Driver Specification
- UDI I2O Driver Specification

Specifications Now Available

- **UDI 1.0 specifications available now**
 - Downloadable from
<http://www.sco.com/UDI/specs.html>
 - Final proofreading draft (1.0rc3) available today
 - Final 1.0 specs scheduled for September 1st
- **Validated by prototype implementations and public review**

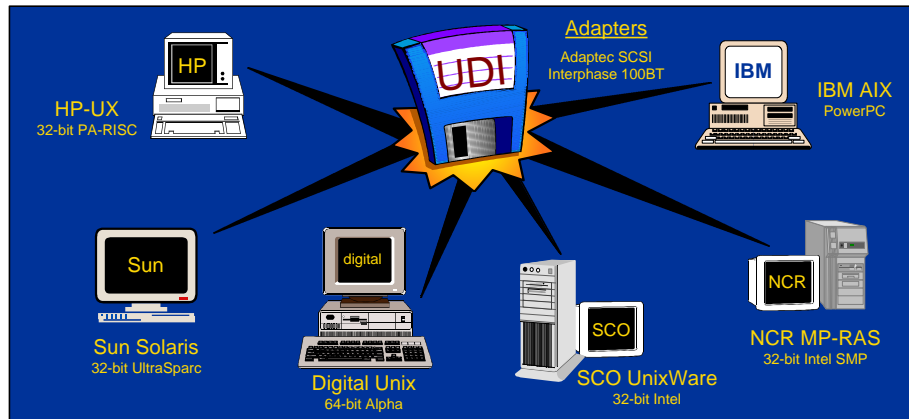


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UDI In Action

- **First prototype completed end of 1997**
 - Single driver source, no #ifdefs, no modifications



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Reference Implementation

- **Sample drivers & metalanguage libraries**
- **Sample OS implementations, including:**
 - Linux*, UnixWare*, HP-UX*, Tru64 UNIX*
 - Easily portable to other OSes
- **Jointly developed by Project UDI members**
- **1.0 reference source available early 4Q99**
 - Public domain source code



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Environment code is about 80% common between these OSes.
Also includes user-mode test environment for POSIX-compatible OSes.

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Related Activities

- **Project UDI works with other groups on related specification efforts, based on UDI**
- **USB drivers**
 - OpenUSBDI spec defines USB Metalanguage
 - Developed/published by USB DWG
- **Compact PCI Hot Swap**
 - Developed/published by PICMG



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USB Device Working Group (DWG) is the part of USB IF (Implementer's Forum) responsible for producing USB specifications. OpenUSBDI currently under public review.

Related Activities

(continued)

- **Graphics drivers**
 - General Graphics Interface re-basing onto UDI
 - Developed by GGI Project (www.ggi-project.org)
- **I₂O* and SCI Metalanguages in progress**
- **VI (Virtual Interface Architecture)**
 - Under consideration by VI Developers Forum
- **“HomeGate” residential gateways**
 - JTC1/SC25/WG1



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Related Activities

(continued)

- **Real-time environments**
 - Newly-formed ANSI R1.1 Technical Committee
 - Developing recommendations for use of UDI in real-time operating systems
- **UDIG (UNIX Developer's Interface Guide for Intel Servers)**
 - IA32 & IA64 UDI ABIs



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Developer Interface Guides

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John Ronciak
Staff Software Engineer
Intel Corporation
E-mail: john.ronciak@intel.com



Developer Interface Guides

- **Problem:**

- Volume solutions, reliability, compatibility, performance traditionally evolve slowly with new architectures

Other OS
ABI/API
Models

UNIX
ABI/API
Models

*Common ABI
and API Models*

- **Solution:**

- Define compatibility between layers to promote concurrent development of complete solution stacks

Other OS
Usage Models
(e.g. Netware, NT)

UDIG

*Common OS &
Driver Usage
Model for IA
Servers*

DIG64

*OS Independent,
Baseline IA64
Server Platform
Interfaces*

Accelerate Compatible IA-64 solutions



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UDIG 1999 Deliverables

UDIG Chapters

Boot and Configuration Guidelines*

Device Driver Guidelines*

Technology Transition*

Performance Guidelines

RAS Guidelines

* Targeted for 1st release, 9/99 industry review



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Device Driver Guidelines

Scope:

- Leverage off the work being done by the Uniform Driver Interface development organization, Project UDI.
- Provide additional implementation guides for OSVs beyond those provided for driver writers by Project UDI that will enable an OSV to create a UDI compliant environment.



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Device Driver Guidelines

Specifications to be provided include:

- 1) **ABI bindings**
 - » This is the specification of the mapping between UDI abstract data types and their corresponding IA-32 and IA-64 bindings

- 2) **Profiles**
 - » This is the specification of which of the optional UDI metalanguages and bindings are required on IA-32 and IA-64 platforms



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UDIG Timeline

Timeframe:

- Draft implementation guides now under final working group review
- Look for notice of industry review in September 1999



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UDI Information

Web page

<http://www.sco.com/UDI>

Project UDI contacts

Chair: Kevin Quick, +1 214 654 5173, kquick@iphase.com

Vice Chair: Mark Evenson, +1 408 447 5601, mevenson@cup.hp.com

Secretary: John Lee, +1 650 786 5323, john.lee@eng.sun.com

Editor: Kurt Gollhardt, +1 908 790 2277, kdg@sco.com

Advisor: Mark Bradley, +1 303 684 4753, markb@btc.adaptec.com



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August 19, 1999

