

# **UDI, a Uniform Driver Interface**

**by**

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# About UDI

# What is UDI?

- **Project UDI: designing and promoting standard driver interfaces**
- **UDI Specification: defines interfaces to/from portable device drivers**
- **UDI abstracts H/W and S/W environment**
  - **Wide range of systems supported by one driver**

# Who is Project UDI?

- **Multiple Operating System Vendors**  
Including Compaq(Digital), HP, IBM, Caldera(SCO), Sun
- **Multiple IHVs**  
Including Adaptec, Bit3, Interphase, AMI, LSI, Intel (Network Adapters)
- **Third Parties**  
Including STG, Unisys, Lockheed-Martin
- **Open to New Participants**

# The “Driver Problem”

- **IHV**s have a huge matrix of drivers to support (cards & OSes)
- **IHV**s establish porting order; some **OS**s drop off list entirely
- **OS** vendors need to compete to stay near top of list
- **Hard for OS** to focus on all driver types (video, audio, telecom, for example)

# The UDI Solution

- **UDI allows device drivers to be portable across both hardware platforms and operating systems without any changes to the driver source**
- **UDI drivers simpler than traditional UNIX drivers**
- **IHV's get more bang for the buck with UDI supported by multiple OSes**
- **UDI moves up the list**

# Key to Portability

- **No OS or platform specific components in driver**
- **No OS policy in driver**
- **All interfaces defined**

# The UDI Technology

- **UDI is next-generation technology, valuable even if not multi-vendor**
  - **Single model for all device types**
  - **Location independence & instance independence**
  - **Complete encapsulation**

# UDI as Technology Enabler

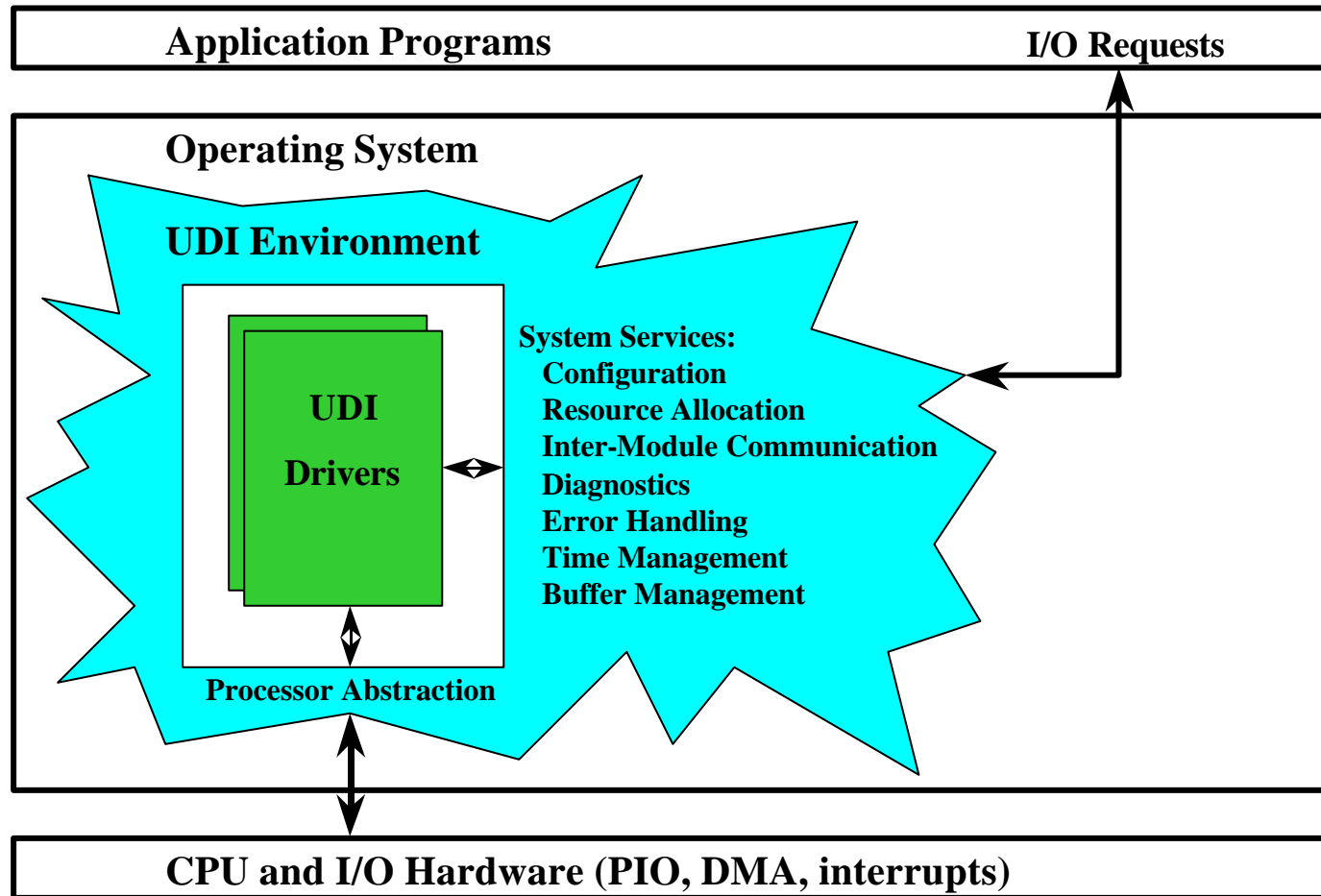
- **UDI simplifies support for:**
  - **“Mixed-model” FibreChannel, SSA, USB, etc.**
  - **I/O processors**
  - **Multi-path I/O**
  - **Hot pluggable controllers (e.g. PCMCIA)**
  - **Mixed-endian platforms and arbitrary bus hierarchies**
  - **User-mode drivers & advanced driver debugging tools**

# Innovative Features

- **Inter-module communication via “channels”**
  - **Marshaling**
  - **Distributed environments**
  - **No overhead for “local” case**
- **Implicit MP synchronization via “regions”**

# Architectural Overview

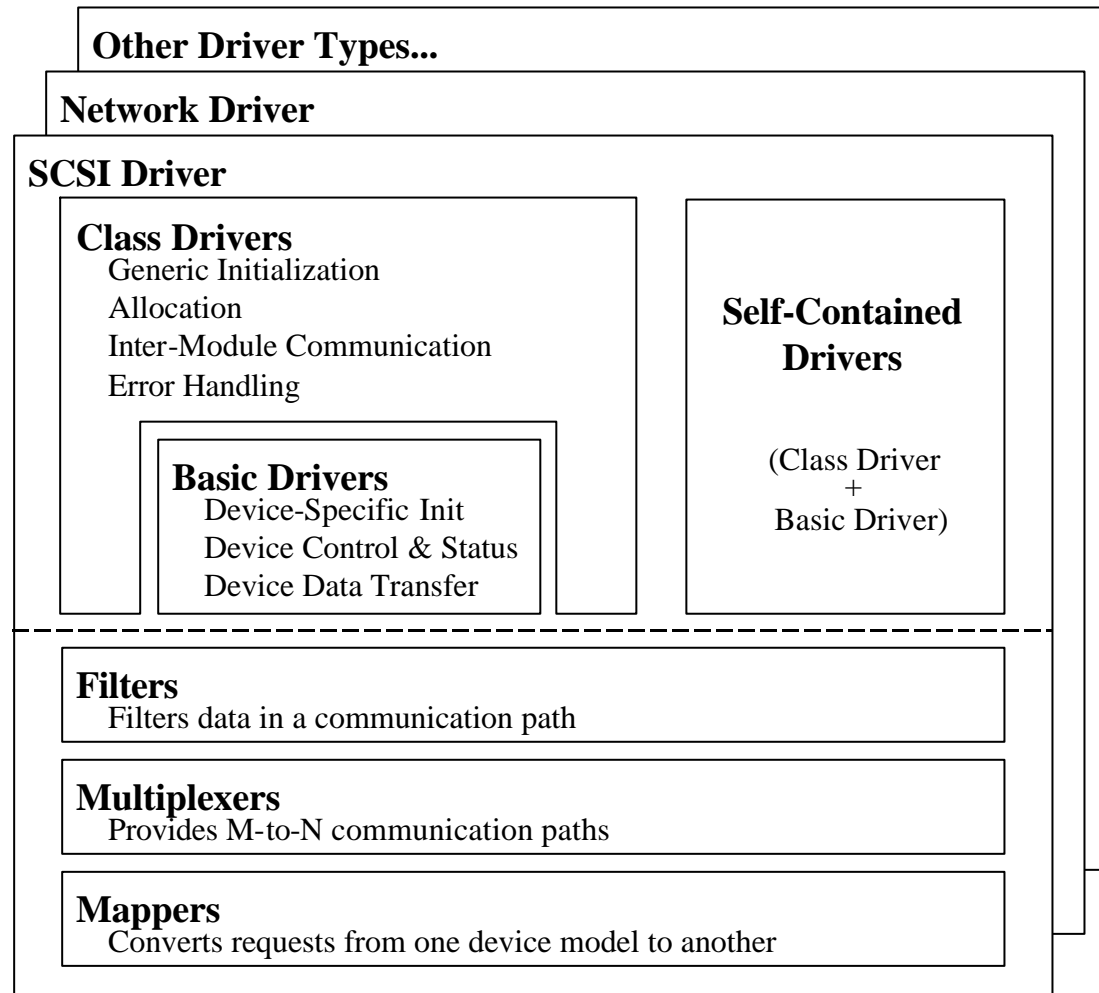
# UDI Fully Encapsulates Drivers



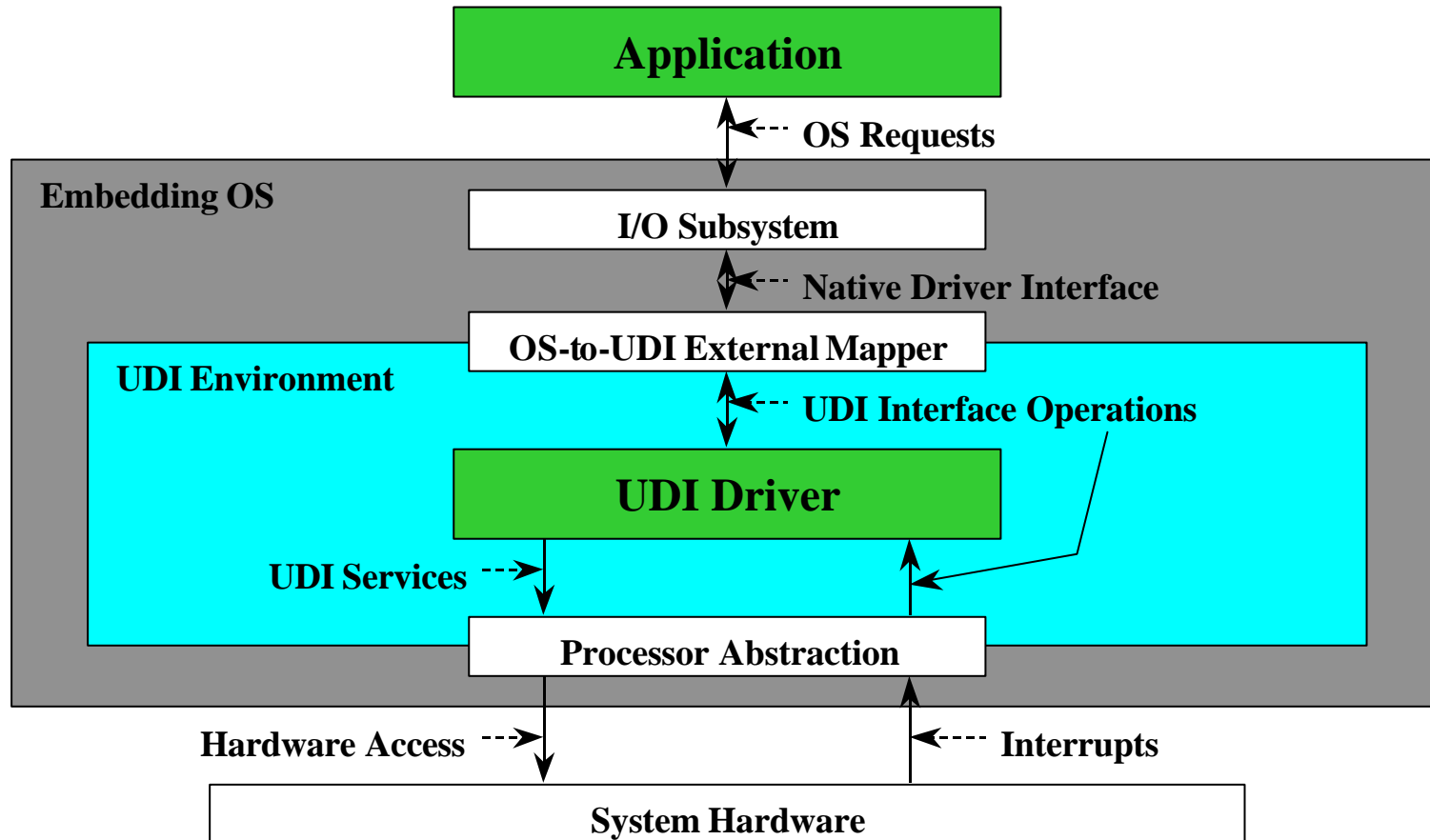
# UDI Functional Areas

- **Basic Data Types**
- **Execution Model**
- **Communication (IMC)**
- **Configuration**
- **Processor Abstraction**
- **Memory Management**
- **Buffer Management**
- **Interrupt Handling**
- **Time Management**
- **Diagnostics & Logging**
- **Powerfail Recovery**
- **Error Handling**
- **Binary Representation (Distribution Format)**

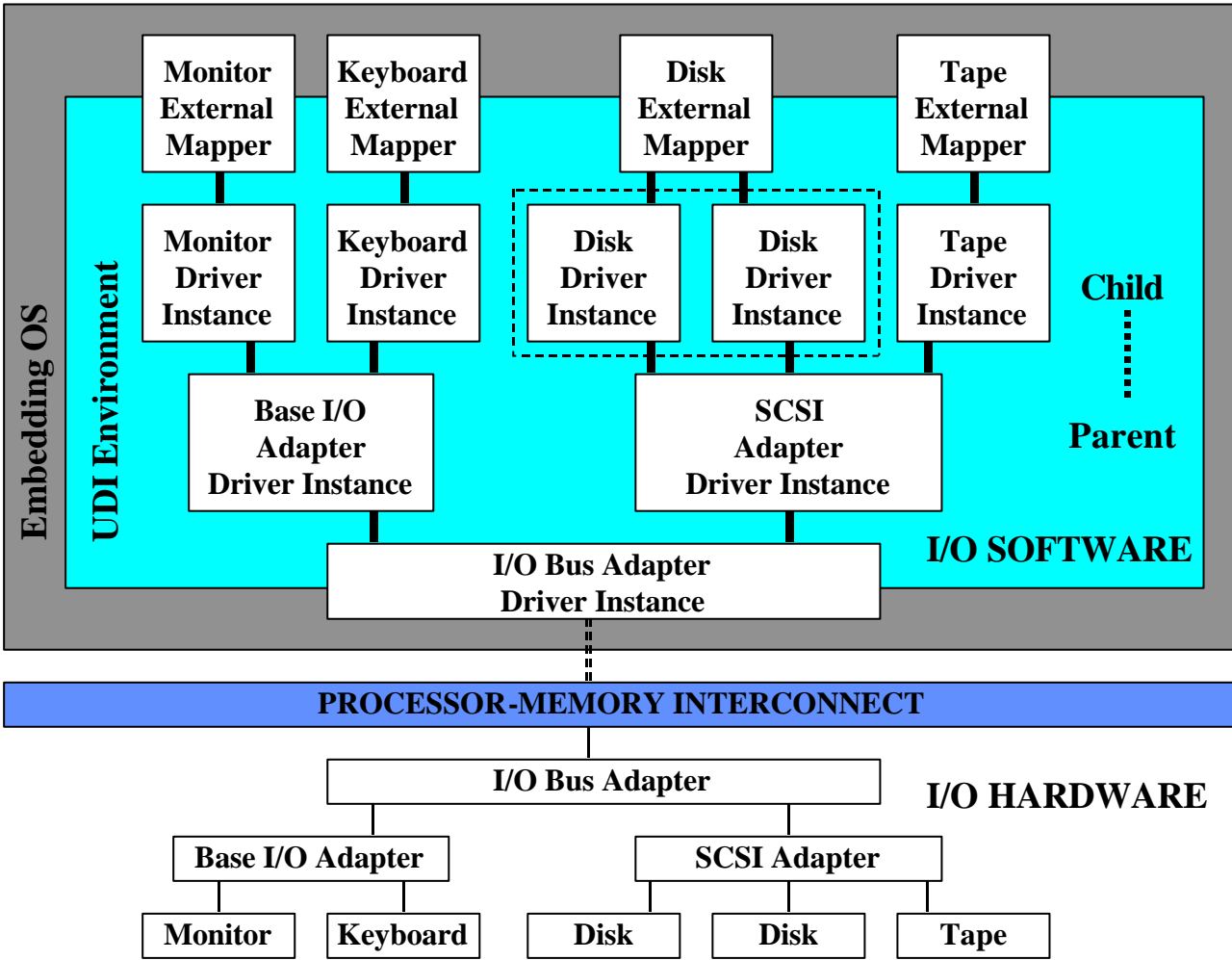
# UDI Driver Classifications



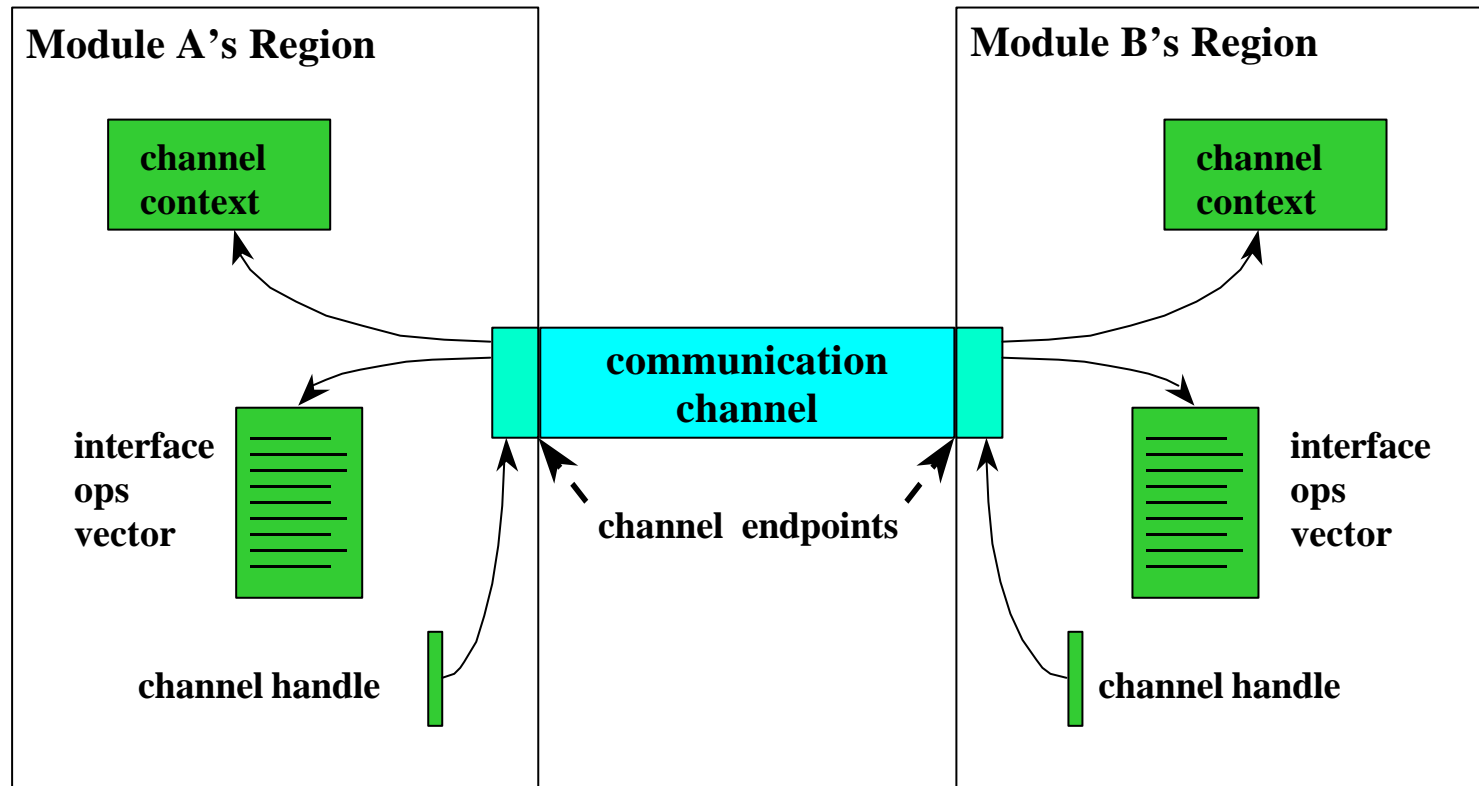
# Path from Application to UDI Driver



# Example Driver Hierarchy



# Channel Communications



# Metalinguages

- **Device-type specific communication**
- **Defines communication paradigm between cooperating modules**
  - number and type of channels
  - interface operation types on each channel
- **Analogous to SCSI CAM, DLPI, etc.**

# More Info

# UDI Documents

- **Book 1: An Introduction to UDI**  
– also called “the white paper”
- **Book 2: Basic Driver Guide**
- **Book 3: Advanced Driver Guide**
- **Book 4: UDI Specification**
- **Book 5: UDI Implementor’s Guide**

# Current Status

- **Specification and related documents available publicly (via anonymous ftp)**
- **1.01 specification released**
  - Working on NCITS standardization
- **Functional Prototype available**
  - Multiple sample drivers including SCSI and NIC
    - » Several other commercial drivers have been developed
  - Several OS ports on various platforms
    - » Linux, UnixWare, OpenServer, FreeBSD, Darwin, Solaris, Monterey, Digital Unix, HP-UX, MP-RAS
    - » Single and multiple processor, multiple endianness, 32- and 64-bit architectures, multiple cache/memory/IO-access architectures

# Related Activities

- **USB Metalanguage**
  - **USBDI Relationship**
- **Domain transport**
  - **Enables clustering and distributed/embedded I/O support**
- **Bridge extensions**
  - **Fabric interconnects**
- **HID Metalanguage**
- **GIO Application API recommendation**
- **Real-time Utilization**
  - **R1.1 Relationship**
  - **Made adjustment to insure RT capability**
  - **Addressing ongoing concerns**

# Call for Participation

- **Technical extension**
  - **New Metalanguages for additional technologies**
  - **Implementation requirements for domain support**
    - » **Example: R1.1**
- **Interoperability test hosting**
- **Certification/Validation**
  - **External to but supported by Project UDI**
- **Implementation and support of UDI products**
  - **Project UDI members can help this effort in numerous ways, including: training, contract development, technical and marketing support materials**

# UDI Information

## Web Page

<http://www.project-udi.org/>

## Project UDI Contacts

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