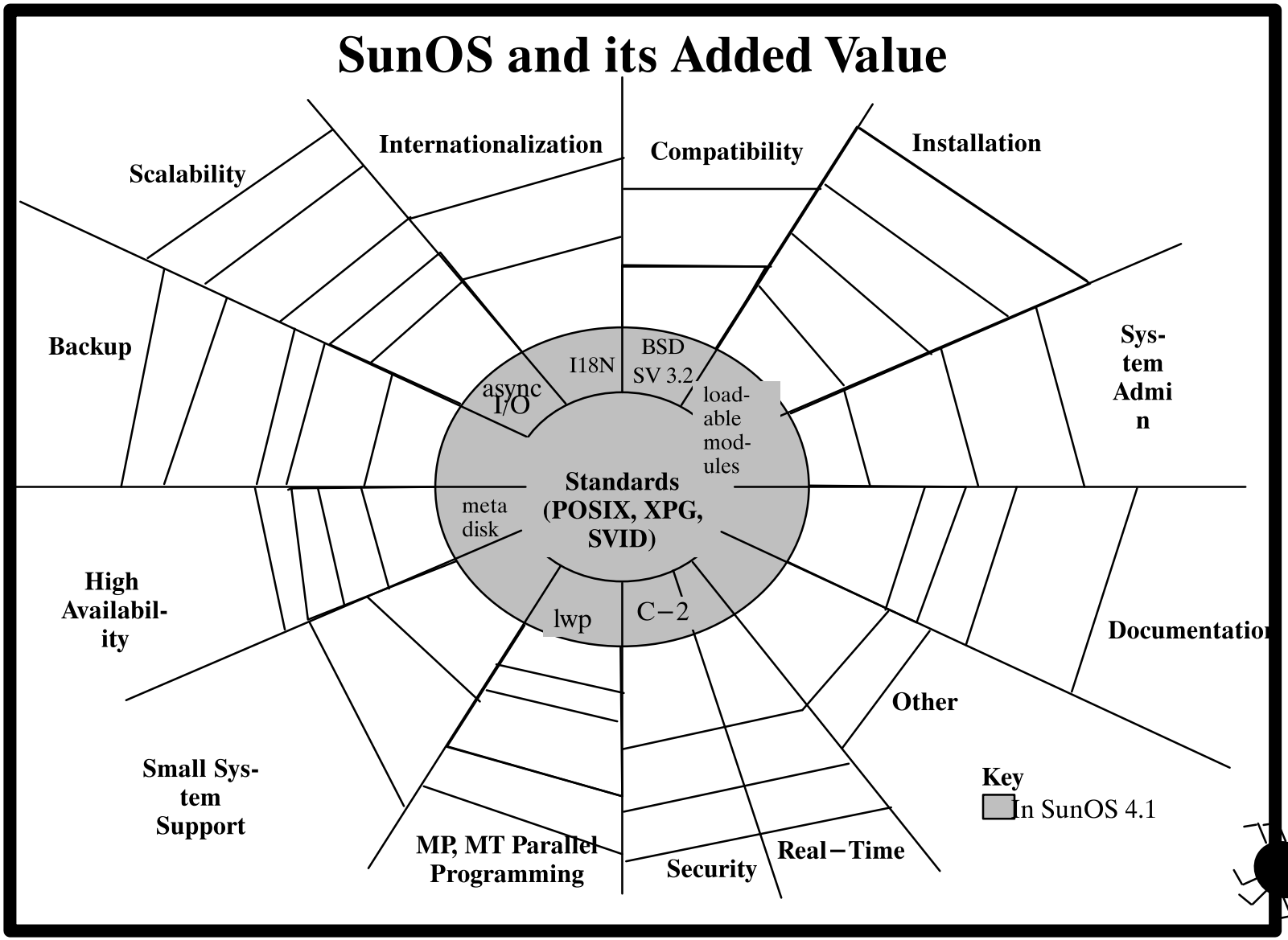


A merge of Technology & Standards making SVr4 and SunOS5.0 the Operating System of the 90's

Planning

- **Preliminary Information**
- **Defining systems & workstation/server groups**
- **Network Sketch**
- **Rewriting Shell Scripts**
- **Third Party Applications**
- **Internally Developed Applications**
- **Unbundled products**
- **Education**

Security

- C2 & DES
- RPC supports Kerberos
- shadow password, disabled logins, password aging etc..

Accounting

- sadp, wtmp

UUCP

- Same as in SunOS 4.1.X

Media Interchange

- tar, cpio, dump

Printing Interoperability

- Both local & networked printed support
  - SunOS 5.0 or SunOS 4.1.X

Performance Utilities

- iostat, nfstat, vmstat, pstat, netstat, sar

Interoperability cont...

- **NIS+**
  - **Better Administration**
  - **Improved Security**
  - **Improved propagation of map changes**

Interoperability cont...

- **NFS**
  - **Uses NFS protocol Rev. 2**
  - **Commands & Config files change for RFS support**
  - **Small changes but no advanced planning required**

- **RFS**
  - **Underlying protocol unchanged**
  - **Commands & Config files change for NFS support**
  - **Small changes but no advanced planning required**

Interoperability

- **TCP/IP**
  - **STREAMS based**
  - **Small changes but no advanced planning required**
- **RPC**
  - **STREAMS based**
  - **Network Independent**
  - **Small changes but no advanced planning required**
  - **ONC Secure RPC support (Kerberos)**
  - **No changes from SunOS 4.1.X**

Terminals & Modem's

- **Service Access Facility (saf)**
- **Service Access Controller (sac)**
- **Improved framework for management of serial lines**
- **Configuration of terminals different from SunOS4.1.X**

Administration File Formats

- Some Administration Files enhanced or moved
  - /etc/fstab
  - /etc/passwd
  - /etc/printcap
- Adjustments to files, directories & scripts may be required

Disk Based File Systems

- BSD – Unix File System
  - No support for s5 file system
  - Can mount s5 FS
- Quickcheck

Client Server Relationships

- SunOS 5.0 Server Support
  - SunOS 4.1.X Diskless clients
  - SunOS 4.1.X Dataless Clients

Third Party Hardware Considerations

- No Binary or Source compatibility for Device Drivers
- Adding Peripherals
  - Loadable Modules
  - Add to running system
  - Different Administration

Hardware Considerations

- Solaris 2.0 on SPARC & Intel
- No support for Motorola or Sun386i
  - Options
    - Upgrade to SPARC
    - Leave @ SunOS 4.1.X
- Product Release Schedule Considerations
  - SunOS 5.0 – 4c & 4m
  - SunOS5.x – 4, 4c, 4m

Transition to SunOS 5.0
Systems Administration/End User

Modes of Operation

- Native
- Binary Compatibility Mode
- Source Compatibility

Considerations

- Internally Developed Applications
- Third Party Requirements
- Sun Unbundled Products

ABI Compliance, Packaging & SCD 2.0

- **Get the SCD 2.0 Spec. from SPARC International (SI)**
  - **535 Middlefield Road**
    Suite 210
    Menlo Park
    CA, 94025
    Ph. 415/321−8692
- **Tools**
  - **Source Code Checker**
  - **Binary Code Verifier**
  - **Prints results of test**
- **Send test results to SI for certification**

Unbundled Graphics Packages

- **XGL 3.0**
- **SunPHIGS 3.0**
- **SunGKS 5.0**

Internationalization

- **Start with OW V3 on SunOS 4.1.1**
- **XView & EUC provides Level 4 Internationalization**
- **Locales**

4.1.X	5.0
C	C
	X/Open
	German
	French
	Italy

- **Read Internationalization Guide**

OpenWindows 3.0.1

- **No new features above OpenWindows 3.0**
- **API remains unchanged**
- **Some changes due to new system environment in SunOS 5.0**
  - **printtool uses /etc/printcap in V2**
  - **Becomes /etc/lp directory**

STREAMS

- **SunOS 5.0 a superset on SunOS 4.1.X**
  - **Device Drivers need to be changed**
  - **STREAMS/DLPI**
  - **DKI/DDI**
  - **MT−Safe**

TLI

- **SunOS 4.1.X & SunOS 5.0 support AT&T TLI.**
  - **NOT X/Open XTI**
  - **Porting TLI based apps. to SunOS 5.0 should be straight forward**
- **SunOS 5.X will support X/Open XPG4**
  - **XPG4 a superset of XPG3 & TLI**
  - **Porting TLI based apps. to XPG 4 should be straight forward**
- **Option Management breaks between XPG3 & XPG4**
  - **Protocol Manipulation Options etc...**
  - **X/Open does not advise it's use**

Signals

- **SVr4 signals:**
  - **Superset of SunOS4.1−SV Environment**
  - **IEEE−POSIX 1003.1 Compliant**
- **Berkeley Compatibility supported via Source Compatibility Package**

Device Drivers (DKI & DDI)

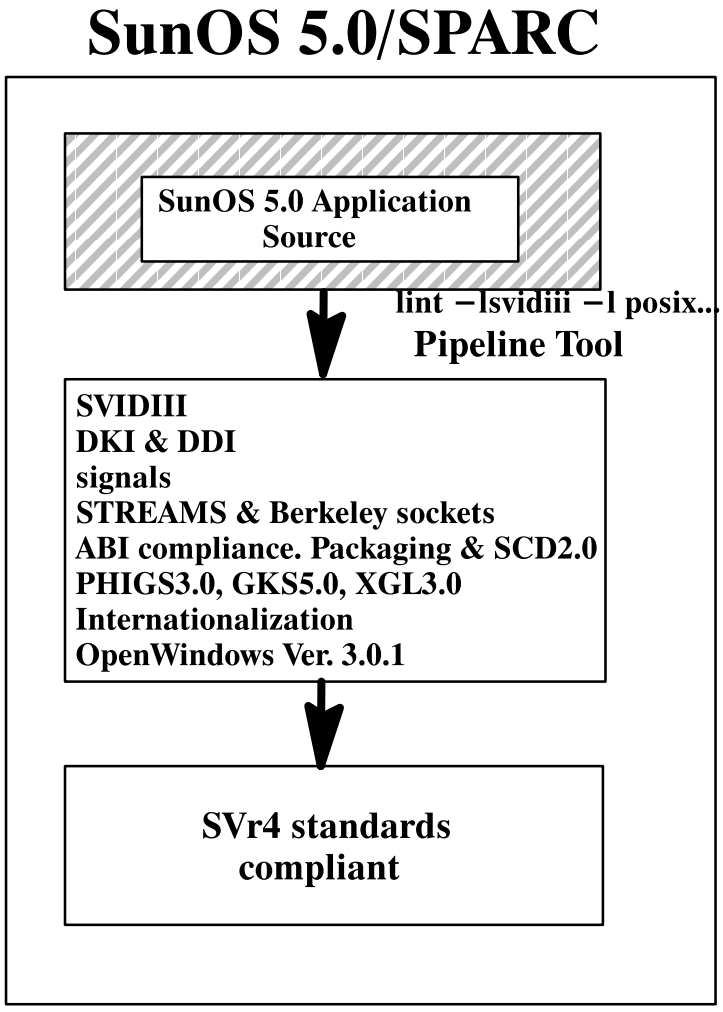
- SunOS 5.0 has no binary compatibility with 4.X drivers
- Source level changes are required
- Considerations
  - MT−safe
  - DKI/DDI
  - Make the driver loadable
  - ANSI C compliance
- New Header file organization under SunOS 5.0
  - Must make changes to reflect new header file organization
- Be sure to work to Sun DDI specification when porting device drivers

SVID 3 & ANSI C

- Check for SVIDIII compliance
  - Run Pipeline Tool
  - lint −l svidiii, posix
- Modify sources for SVIDIII compliance
- Compile with ANSI C compiler
  - Xt
- Tighten up on ANSI C compliance
  - All the ANSI C libs should be available
  - Xa
- Full ANSI C compliance
  - Xc

Working on SunOS 5.0 Platform

Completing the Transition on SunOS 5.0



Device Drivers (DKI & DDI)

- You can not become Sun DDI compliant on SunOS 4.1.X
- Considerations for Current Device Drivers
  - Make the driver loadable
  - Bring to ANSI C compliance
- Recommendation for new device drivers
  - Wait till SunOS 5.0

Graphics Packages

- **Port graphics applications to 4.1.1 using the latest unbundled graphics package**
  - **XGL 2.0**
  - **SunGKS 4.0**
  - **SunPHIGS 2.0**

OpenWindows Ver 3.0 Transition

OpenWindows V2	OpenWindows V3	Change	New
Xview 2.0	XView 3.0	Source & Binary Compatibility except: Drag & Drop XVPS Calls	Multiple Visual Support Drag & Drop API Internationalization Mouseless Operation Soft Function Keys
OLIT 2.0 2.5 unbundled	OLIT 3.0	Source Compatible OLIT 2.5 apps. Recompile on SunOS 5.0	3D Widgets Multiple Visual Support Mouseless Operation Draw Area Widget Drag & Drop API Runs with any ICCCM Window Manager
TNT 1.0	TNT 2.0	Incompatible with: NeWs 1.1 TNT 1.0 Lite	OpenLook Components JOT Library Wire Service
X11/NeWs	X11/NeWs	X11/NeWs	24 bit Color Double Buffer PEX Support

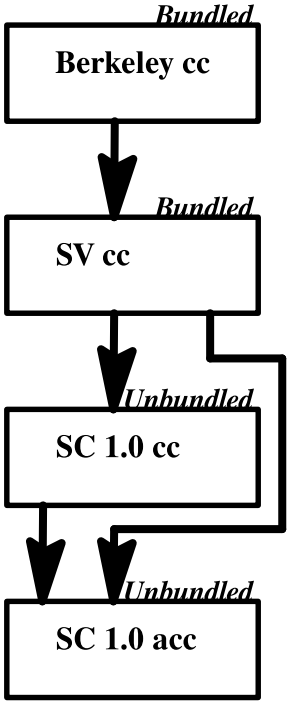
Dynamic Linking

- **Programs maps shared objects it uses into VA space at run time**
  - **Saves disk space & main memory**
  - **Increases systems performance**
  - **Shared library can be enhanced without relinking apps**
  - **Increases portability**
- **ABI defined in terms of dynamic linking**
- **Some cases when it should be avoided**
  - **When bookkeeping information used by dynamic linker uses more space than the code (size command)**
  - **Security**

Transition to ANSI C in SV Environment on SunOS4.1.X

Compiler (4.1.X)	Env	path	compiler line
Bundled **Berkeley cc**	ucb	/usr/ucb	cc prog.c
Unbundled **SC 1.0 cc**	ucb	/usr/lang	cc prog.c *Note: sc1.0 header files and libs will be extracted first in this case*
Unbundled **SC 1.0 cc**	SV	/usr/lang	cc −I/usr/5include prog.c −L/usr/5lib −O2/3/4 *Note: Convert to SV semantics and syntax etc...*
Unbundled **SC 1.0 acc**	SV	/usr/lang	acc −Xt −I/usr/lang/SC1.0/ansi_include −I/usr/5include prog.c −L/usr/lang/SC1.0/ansi_lib −L/usr/5lib −O2 *Note: Do NOT use −Xa or −Xc in this mode due to semantic problems that may arise*

Transition to ANSI C in SV Environment on SunOS4.1.X



Compiler (4.1.X)	Env	path	compiler line
Berkeley cc	ucb	/usr/ucb	cc prog.c
SV cc	SV	/usr/5bin	cc prog.c *Note: Convert to SV semantics and syntax etc...*
SC 1.0 cc	SV	/usr/lang	cc −I/usr/5include prog.c −L/usr/5lib −O2/3/4
SC 1.0 acc	SV	/usr/lang	acc −Xt −I/usr/lang/SC1.0/ansi_include −I/usr/5include prog.c −L/usr/lang/SC1.0/ansi_lib −L/usr/5lib −O2 *Note: Do NOT use −Xa or −Xc in this mode due to semantic problems that may arise*

Search Paths for SC1.0 (acc and cc)

	acc	cc
Header Files	/usr/lang/SC1.0/ansi_include /usr/lang/SC1.0/include /usr/include	/usr/lang/SC1.0/include /usr/include
Library Files	/usr/lang/SC1.0/cg87 /usr/lang/SC1.0 /usr/lang/SC1.0/ansi_lib /usr/lib	/usr/lang/SC1.0/cg87 /usr/lang/SC1.0 /usr/lib

Transition to ANSI C in SV Environment on SunOS4.1.X

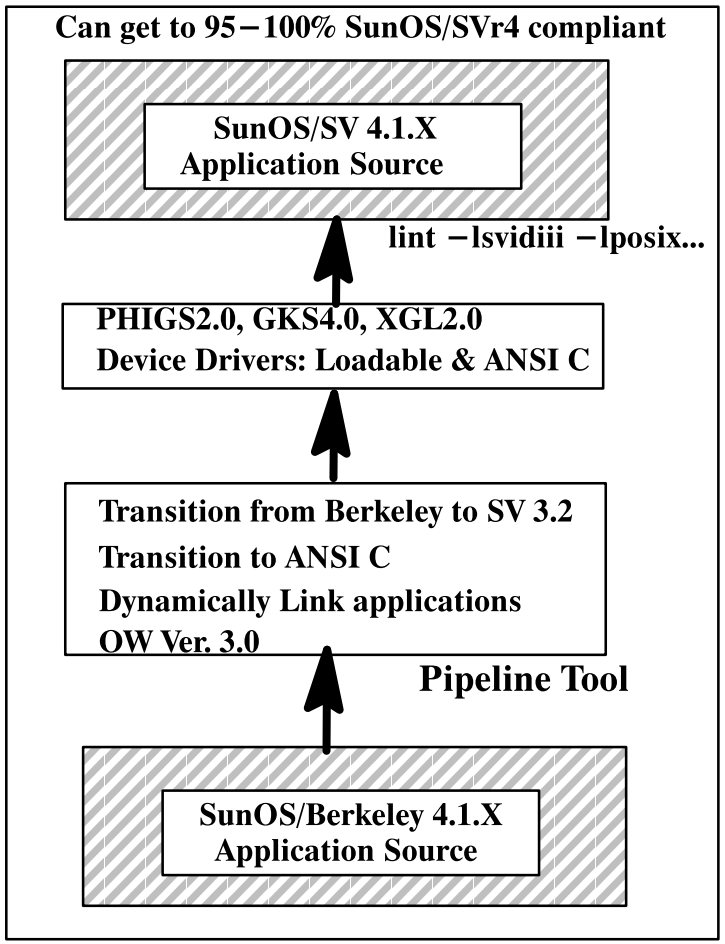
- **Move to SV Environment**
  - **Compile with /usr/5bin/cc for svidIII (prog.c)**
- **Change to ANSI C semantics**
  - **Function Prototypes**
  - **Remove Warnings**
  - **ifdef __STDC__ etc.....**
- **Compile & link with ANSI C compiler**
  - **acc −Xt −I/usr/lang/SC1.0/ansi_include −I/usr/5include prog.c −L/usr/lang/SC1.0/ansi_lib −L/usr/5lib −O2**
- **Recommendation:** ***Do NOT use −Xa or Xc switches in this mode***

Transition from Berkeley to AT&T SV Environment

- Set Path to use System V development environment on 4.1.1
  - /usr/5bin/cc
  - Build & test shell scripts to /usr/5bin
- Run Pipeline Tool on application code
- Check adherence to posix (man posix)
  - lint −lposix filename.c
- Check adherence to SVIDIII (man svidiii)
  - lint −lsvidiii filename.c
- Consult Venn Diagrams & CMI Documentation

Transition to SunOS 5.0

SunOS 4.1.1/SPARC



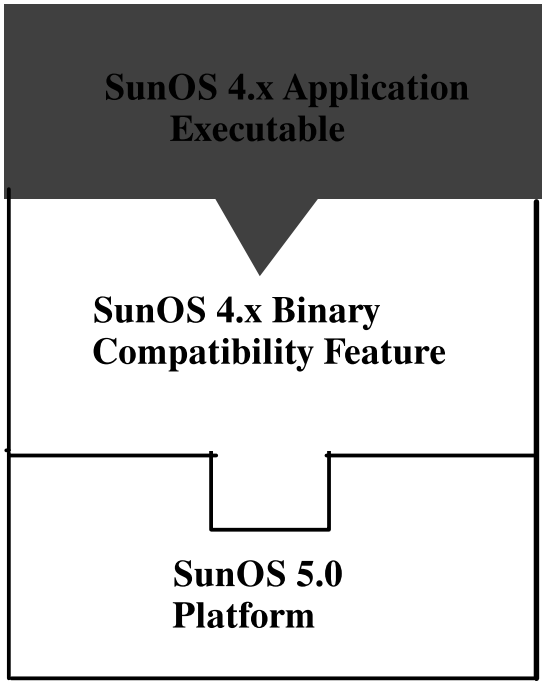
Working on 4.1.1 platform

Berkeley Compatibility

Binary Compatibility Package (BCP)

What BCP is:
- Optional Package
- A Migration Tool
- A product that allows well behaved SunOS apps to run unchanged.

What BCP is not:
- A long term solution
- A development platform
- A reason to NOT port to SunOS 5.0



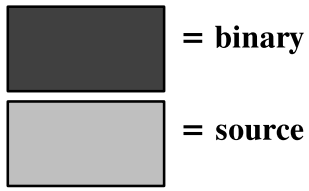
Applications must be well behaved:
- Dynamically linked
- Do not trap directly to the kernel
- Do not use unpublished SunOS Interfaces
- Do not use /dev/kmem or libkvm
- Do not rely on non SunOS drivers
- Do not write directly to system files

SunOS 3.X apps cannot use this package

Some system calls are not supported. Eg. swapon()

Some data files are not present. Eg. /etc/ttys

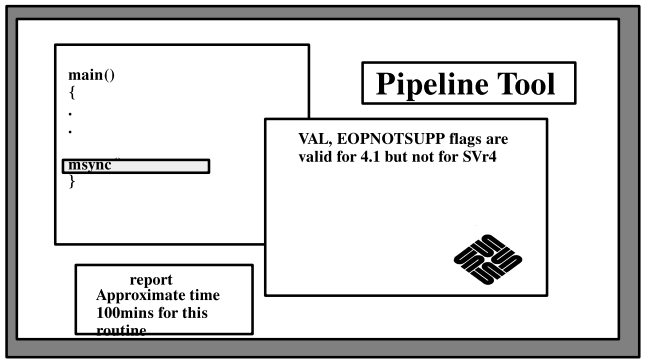
Performance: 3% – 20% degradation



BCP
Source Compatibility Support also provided

Transition Tools

Solaris1.0/SPARC

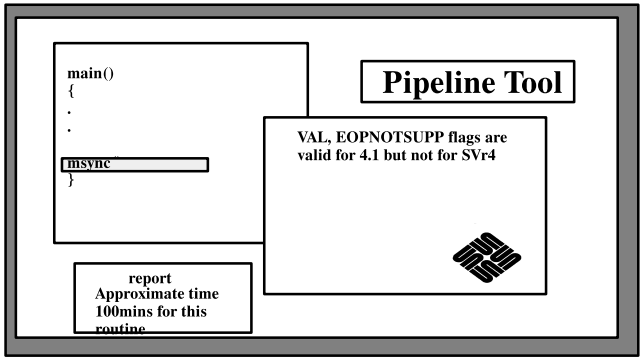


/usr/lib/lint
/usr/5lib/lint
ANSI C Compiler
Xt, Xa, Xc
Debugging

PORT

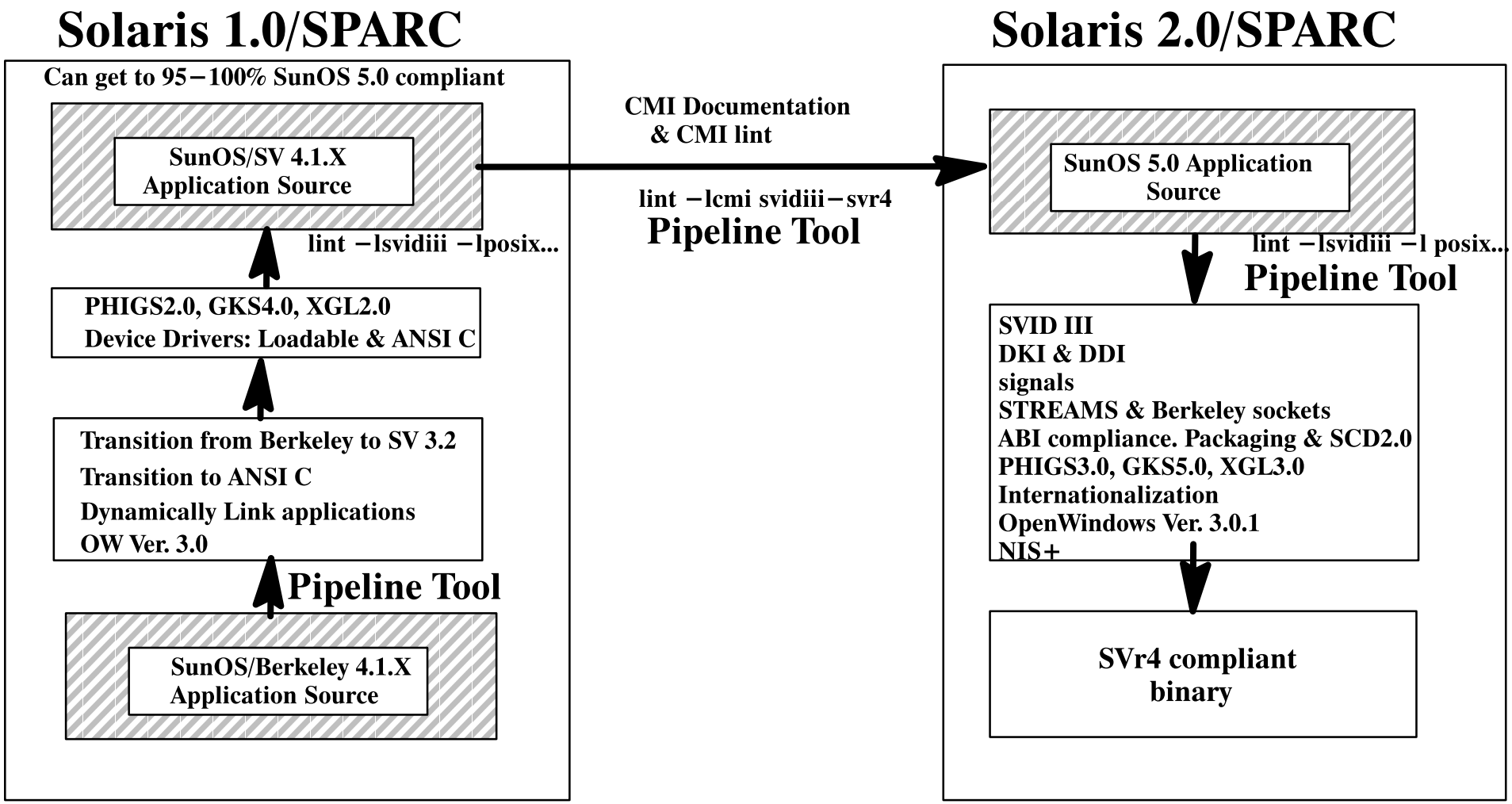
CMI Documentation
& CMI Lint Tool

Solaris2.0/SPARC

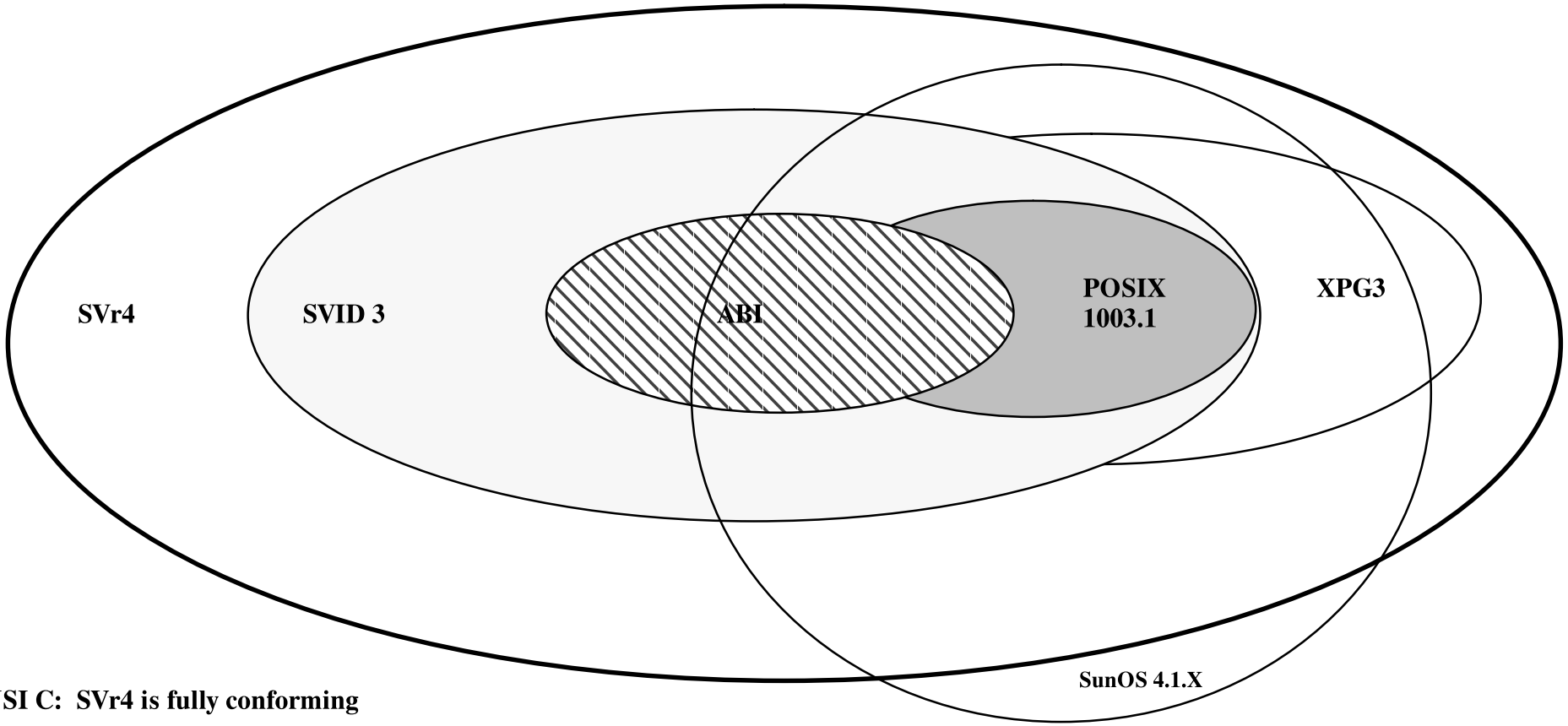


CMI lint
lint
BCP
Source Compatibility
ANSI C Compiler
Xs, Xt, Xa, Xc
Debugging
adb, kadb, dbx
truss, cscope

Transition to SunOS 5.0



Transition to SunOS 5.0



ANSI C: SVr4 is fully conforming

Transition to SunOS 5.0

- **Developer**

- **End User or Systems Administrator**

Sun Microsystems, Inc.

Solaris 2.0

Technical Transition

Norman Eaglestone

Systems for Open Computing