Solaris™ Operating Environment Intel Platform Edition

Intel Developer's Forum
Fall 1999

Solaris Momentum

- UNIX: 40% of Server Revenue

- Solaris: 35% of UNIX market

- Solaris market acceptance
    - ❑ #1 in enterprise server shipments

- Solaris application growth
    - ❑ 12K applications on Solaris (3.5K on Intel)

"UNIX will remain dominant platform ... and the leading platform for scalable enterprise applications"

- International Data Corporation

Solaris Momentum

- Free Solaris for non-commercial use
  - ❑ over 100K copies downloaded

- Solaris-Intel system partners
  - ❑ NCR, Siemens, Fujitsu, Amdahl and Toshiba

- Solaris on Intel performance leadership
  - ❑ Industry leading SPECweb performance
  - ❑ Industry leading TPC-D performance
  - ❑ Java scalability and performance leadership

- Solaris on Itanium™
  - ❑ On Intel's pre-silicon development environment platform
  - ❑ IA-64 enabled Solaris on production Itanium™ systems

Solaris Features

- Complete 32 bit & 64 bit Operating Environment

- Best Java platform

- High Performance

- Scalability

- High Availability

- Security

- Easy to Manage

- Interoperability

Solaris - Built for large scale computing
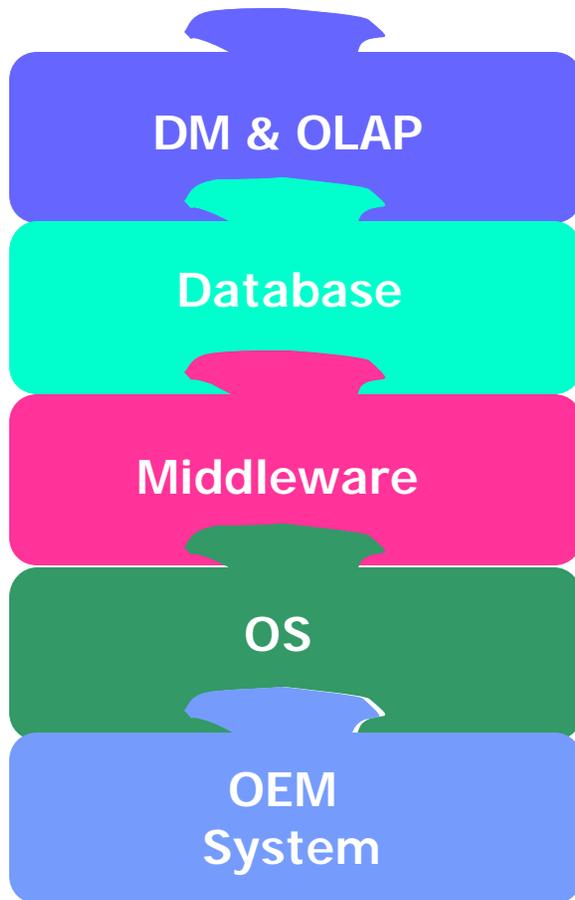
Solaris IA-64 Goals

- Extend and optimize Solaris-Intel on IA-64

- Leverage Solaris 64 bit technology on Intel Architecture

- Binary compatibility for existing Solaris Intel applications

- Source compatibility for existing Solaris SPARC applications

- Deliver complete tools, middleware, and application solutions

- Market through Solaris and Solaris-Intel system partners

Solaris IA-64 Solution

Solutions	Products	Features	
Applications	Alliance	Web Server Mail Server	Application Server E-Commerce Applications
Middleware	Clustering	High Availability Sun Cluster 3.0	Redundant Storage Management
	SEAS	Directory Services Ease of Use	NT Network Interoperability
OS	Solaris Operating Environment & Tools	Complete 64 bit support I2O IPSEC ccNUMA USB UDI	Optimized OS and Tools for IA64 Enterprise Class Java Security (Kerberos v5) IPV6 PCI & SCSI Hot Plug
Hardware	IA64 Servers	Siemens Fujitsu	NCR Toshiba

Solaris IA-64 Solution

DM & OLAP

Database

Middleware

OS

OEM System

- SAS

- Oracle, Informix, TimesTen

- Sun Cluster 3.0, App Server

- Solaris for IA-64

- Siemens, NCR, Fujitsu, Toshiba

Data Mining & OLAP Stack

Solaris IA-64 Solution

E-Commerce

Webserver

Middleware

OS

OEM System

- B-to-B and B-to-C

- Netscape Enterprise Server

- Sun Cluster 3.0, App Server

- Solaris for IA-64, Enterprise JAVA

- Siemens, NCR, Fujitsu, Toshiba

E-Commerce Stack

Solaris on IA-64 Opportunity

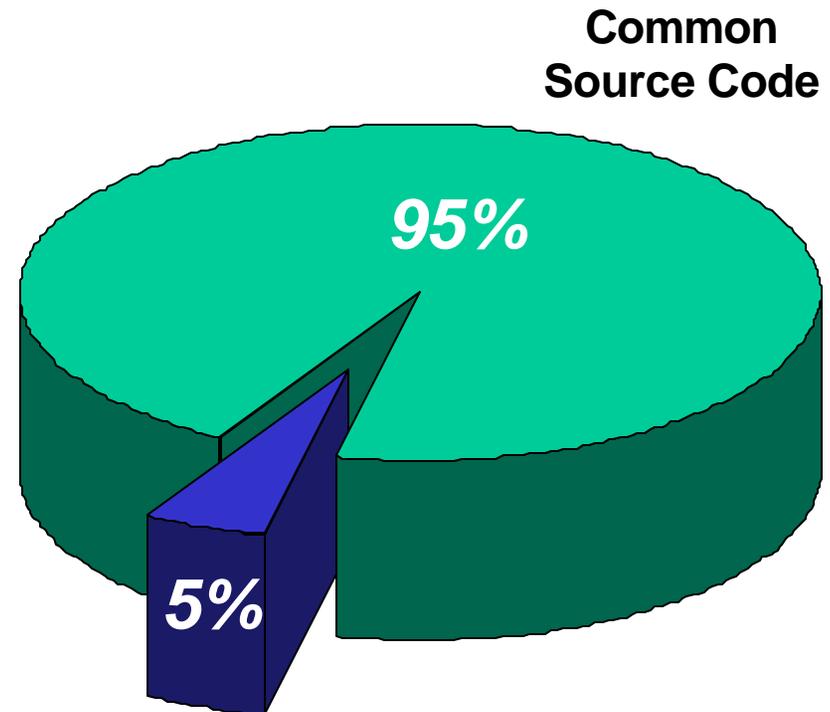| Minimal ISV Investment	Incremental Revenues Today
• 64-bit and 32-bit API compatibility	AMDAHL
• Proven IA-32 binary compatibility	FUJITSU
• One source base, common APIs for all platforms	NCR
	SIEMENS
• Complete 32-bit and 64-bit Operating Environment	TOSHIBA

Solaris System Partners enabled for IA-64 with the availability of Itanium™ in 2H'00

Solaris IA-64 Advantage

- Single source base for multiple platforms

- >95% platform independent

- Common APIs for all platforms

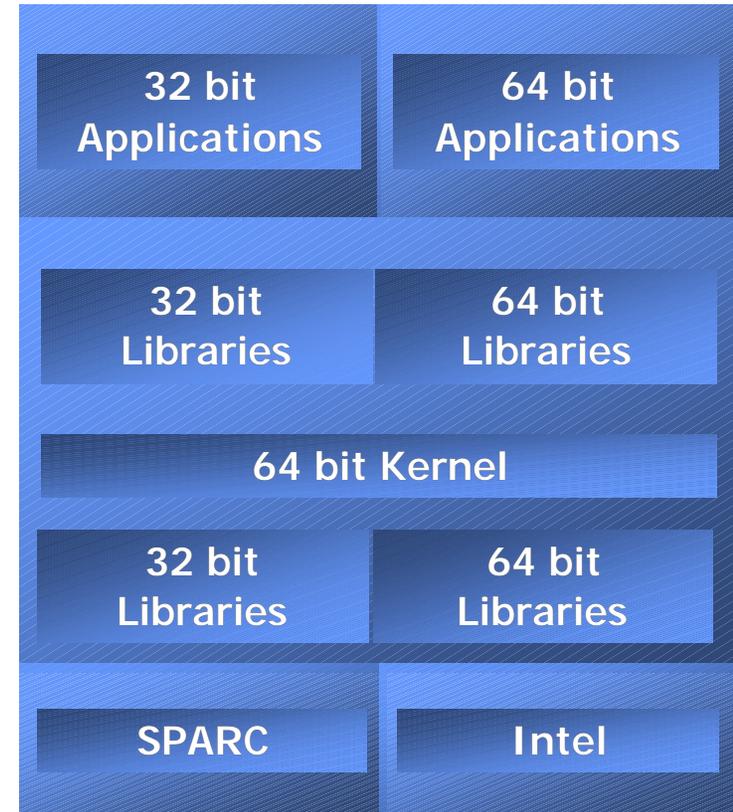- Endian neutral

- Optimized for IA-64

**Common
Source Code**

95%

5%

**Platform and Instruction Set Specific
Source Code (both SPARC and Intel)**

One Solaris Multiple Platforms

Solaris IA-64 Advantage

- Extended capacity
  - ❑ 64 bit files & file system

- Enhanced performance
  - ❑ 64 bit virtual addressing

- Extended precision
  - ❑ 64 bit arithmetic

- Compatibility
  - ❑ LP64 industry standard
  - ❑ 32 bit binary compatibility
  - ❑ One source base

32 bit Applications	64 bit Applications
32 bit Libraries	64 bit Libraries
64 bit Kernel	
32 bit Libraries	64 bit Libraries
SPARC	Intel

Proven 64 bit Computing

Solaris Software Environment

- Unix98 (XPG5) "bit-ness neutral" standard API

- 32 bit APIs
    - ❑ Same as existing Solaris APIs
    - ❑ Large File API
    - ❑ Same libraries as on IA32 platforms

- 64 bit APIs
    - ❑ Derived data types yield 64 bit versions of existing APIs
    - ❑ Get large files without using large file APIs

- Industry standard
    - ❑ UNIX98
    - ❑ LP64

Solaris Software Environment

- 32 bit applications
  - ❏ IA32 (ILP32)

- AS31
  - ❏ A transition aid

- 64 bit applications
  - ❏ IA-64 (LP64)
  - ❏ Only longs and pointers become 64 bit
  - ❏ Floating point and other types unchanged

- 64 bit applications need to be "LP64 clean"

- 32 bit applications don't need to change

Data Type	ILP32		LP64	
	Size	Align	Size	Align
Char	8	1	8	1
short	16	2	16	2
int	32	4	32	4
long	32	4	64	8
long long	64	4	64	8
Pointers	32	4	64	8
double	64	4	64	8
long double	96	4	128	16

Solaris Software Environment

- Headers
    - ❑ Cleaned up in Solaris 7 for shared ILP32/LP64 support
    - ❑ Feature test macros: _LP64 and __ia64

- Libraries
    - ❑ Separate library objects for 32 bit and 64 bit
        /usr/lib/libc.so.1
        /usr/lib/ia64/libc.so.1

- User PATHs unchanged

Solaris Software Environment

- 64 bit APIs from derived data types

    ssize_t read(int *fildes*, void **buf*, size_t *nbyte*);

- Derives to the following 32 bit API:

    int read(int *fildes*, void **buf*, unsigned int *nbyte*);

  and this for 64 bit:

    long read(int *fildes*, void **buf*, unsigned long *nbyte*);

Solaris Software Environment

- Tools

  The following Sun compilers and tools will be provided and
  supported for Solaris-Intel on IA-64

    □ C Compiler
    □ C++ Compiler
    □ Debugger
    □ Teamware
    □ GUI builder
    □ Integrated Development Environment
    □ Rogue Wave utilities

  *Compatible front-ends for compilers
  and tools on all supported platforms*

Solaris ISV Transition

Path to 64 bit Clean Code

- Examine external interfaces and use derived types for portable interfaces

- Clean code with lint in both 32 bit & 64 bit environments

Solaris Applications Today	Transition to Merced
Intel IA32	Applications Just Run!
	Make 64 bit clean & recompile to IA64
SPARC 32 bit	Make 64 bit clean & recompile to IA64
SPARC 64 bit	Recompile to IA64

Just Run or Recompile & Run
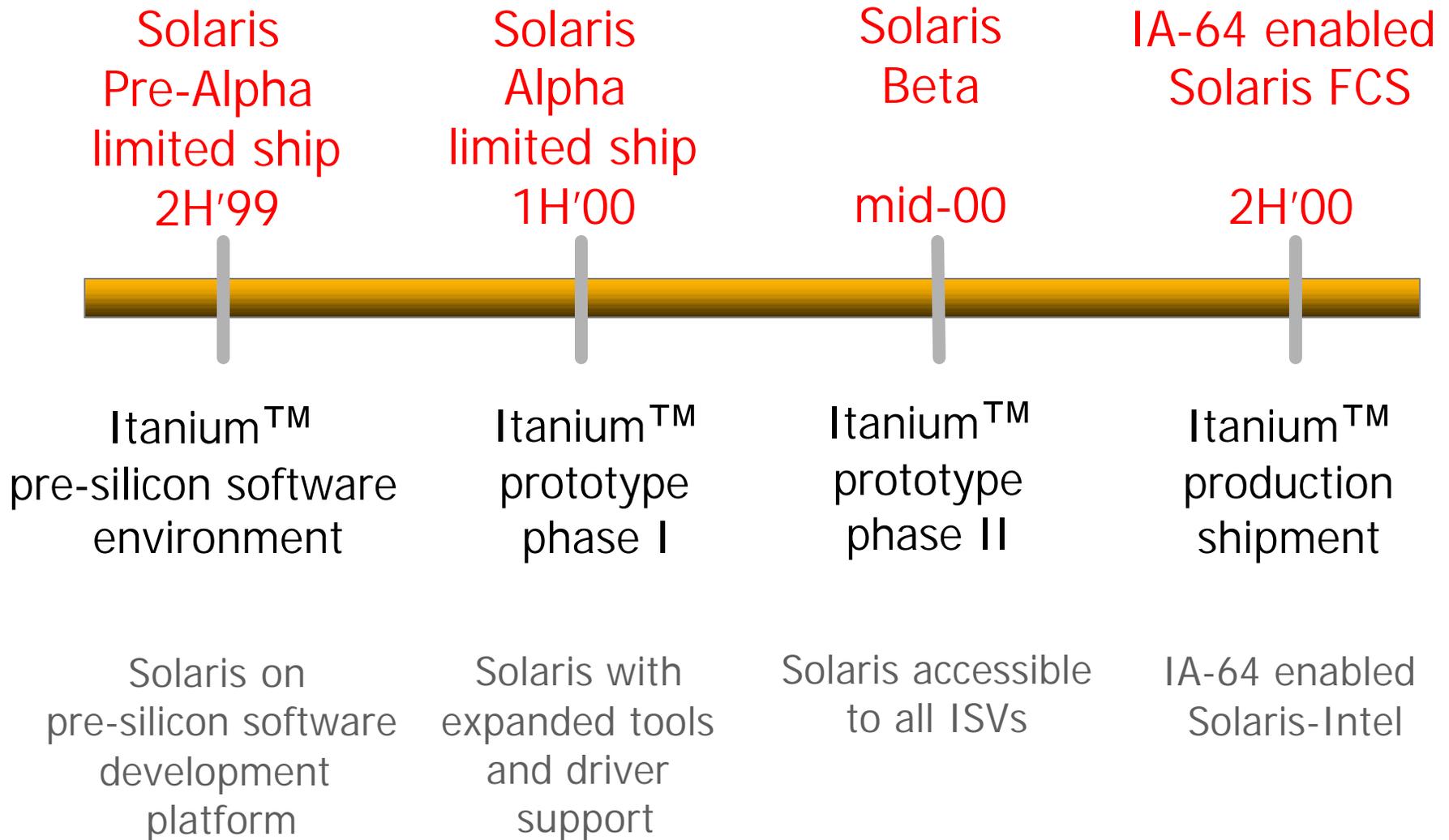
Solaris ISV Programs

- Sun Developer Connection Program

- Sun Info Essentials(SM)

- Sun Developer Essentials(SM)

- Sun Support Access(SM)

- Sun Customer Access(SM)

- Development Centers for Solaris-Intel Platforms
  - □ Mountain View, CA.
  - □ Burlington, MA.
  - □ Paderborn, Germany (Siemens supported)

- Contact information at end of presentation

Solaris IHV Transition

- 64 bit enabled Solaris DDI/DKI were introduced in Solaris 7

- Solaris 7 DDI/DKI APIs are identical on all platforms (Sparc and Intel ~ 32 bit and 64 bit)

- All device drivers must be "LP64 clean" to operate on 64 bit platforms

- Minor modifications to legacy IA32 drivers may be required to allow them to satisfy IOCTL requests from both 64 bit and 32 bit applications

Solaris on IA-64 Milestones

Solaris
Pre-Alpha
limited ship
2H'99

Solaris
Alpha
limited ship
1H'00

Solaris
Beta

mid-00

IA-64 enabled
Solaris FCS

2H'00

Itanium™
pre-silicon software
environment

Itanium™
prototype
phase I

Itanium™
prototype
phase II

Itanium™
production
shipment

Solaris on
pre-silicon software
development
platform

Solaris with
expanded tools
and driver
support

Solaris accessible
to all ISVs

IA-64 enabled
Solaris-Intel

20

ISV Engagement Milestones

Pre Alpha Limited Ship - 2H'99

- Early access for enabling applications
- Hosted on Intel's pre-silicon development environment platform
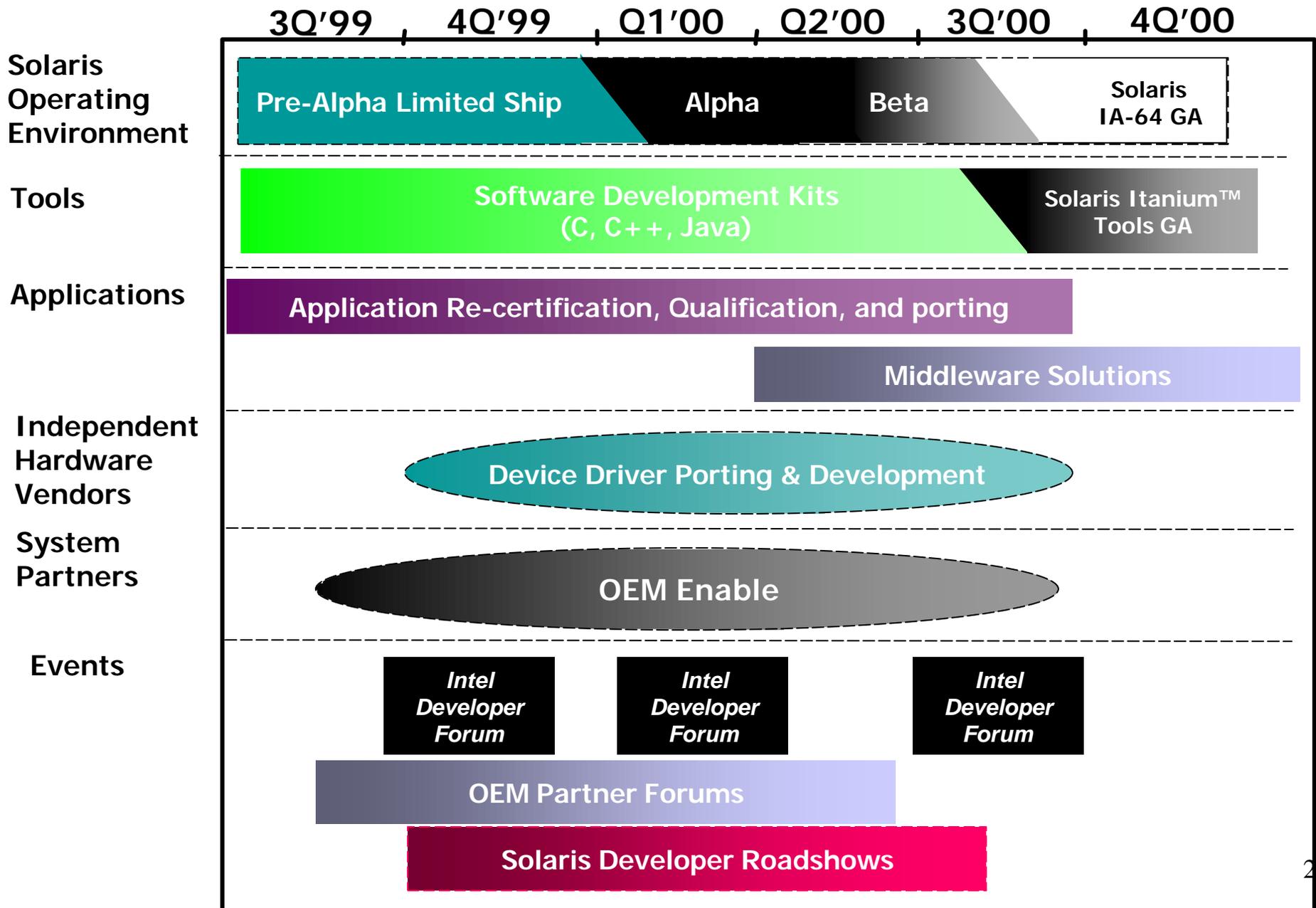- Cross development on Solaris 8 beta

Alpha Limited Ship Deliverables - 1H'00

- Early access on hardware for development
- White papers
- Solaris-Intel (IA-64) hosted development, debug and test environment

Beta Ship Deliverables - Mid-00

- Early access to final product
- Standard Solaris beta program deliverables

Solaris IA-64 Roadmap

	3Q'99	4Q'99	Q1'00	Q2'00	3Q'00	4Q'00
Solaris Operating Environment	Pre-Alpha Limited Ship		Alpha		Beta	Solaris IA-64 GA
Tools	Software Development Kits (C, C++, Java)					Solaris Itanium™ Tools GA
Applications	Application Re-certification, Qualification, and porting					Middleware Solutions
Independent Hardware Vendors		Device Driver Porting & Development				
System Partners	OEM Enable					
Events		Intel Developer Forum	Intel Developer Forum		Intel Developer Forum	
	OEM Partner Forums					
	Solaris Developer Roadshows					

Call to Action

- Take full advantage of the power of IA-64 computing by planning to introduce your applications on IA-64 enabled Solaris

- Be highlighted:
  - Key ISV Partner for Solaris-IA in the Enterprise
  - Premium 64 bit application for on Solaris IA-64

- Tell us about your dependencies to build 64 bit applications on Solaris

- Contact Sun's IA-64 developer and marketing programs

Solaris IA-64 Contact

- Contact Sun's IA-64 developer and marketing programs

  - Sun Developer Connection

    - www.sun.com/developers/solaris64

    - 1-800-945-6111 or (303) 338-9561 or dev@sun.com
      (ask for the "Solaris IA-64 Program")

    - Contact your ISV account manager

  - Solaris Driver Developer Site

    - www.soldc.sun.com/developer/support/driver