



PowerPC Linux

Linux Superclusters Conference

September 22, 2000

Gregory Rodgers
IBM Enterprise Systems Group

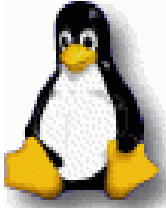




Agenda

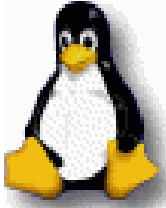
- IBM Involvement in PowerPC Linux
- PowerPC Linux History and Status
- Types of PowerPC Linux
- Current Issues
- POWER3 Linux
- PowerPC Linux Future



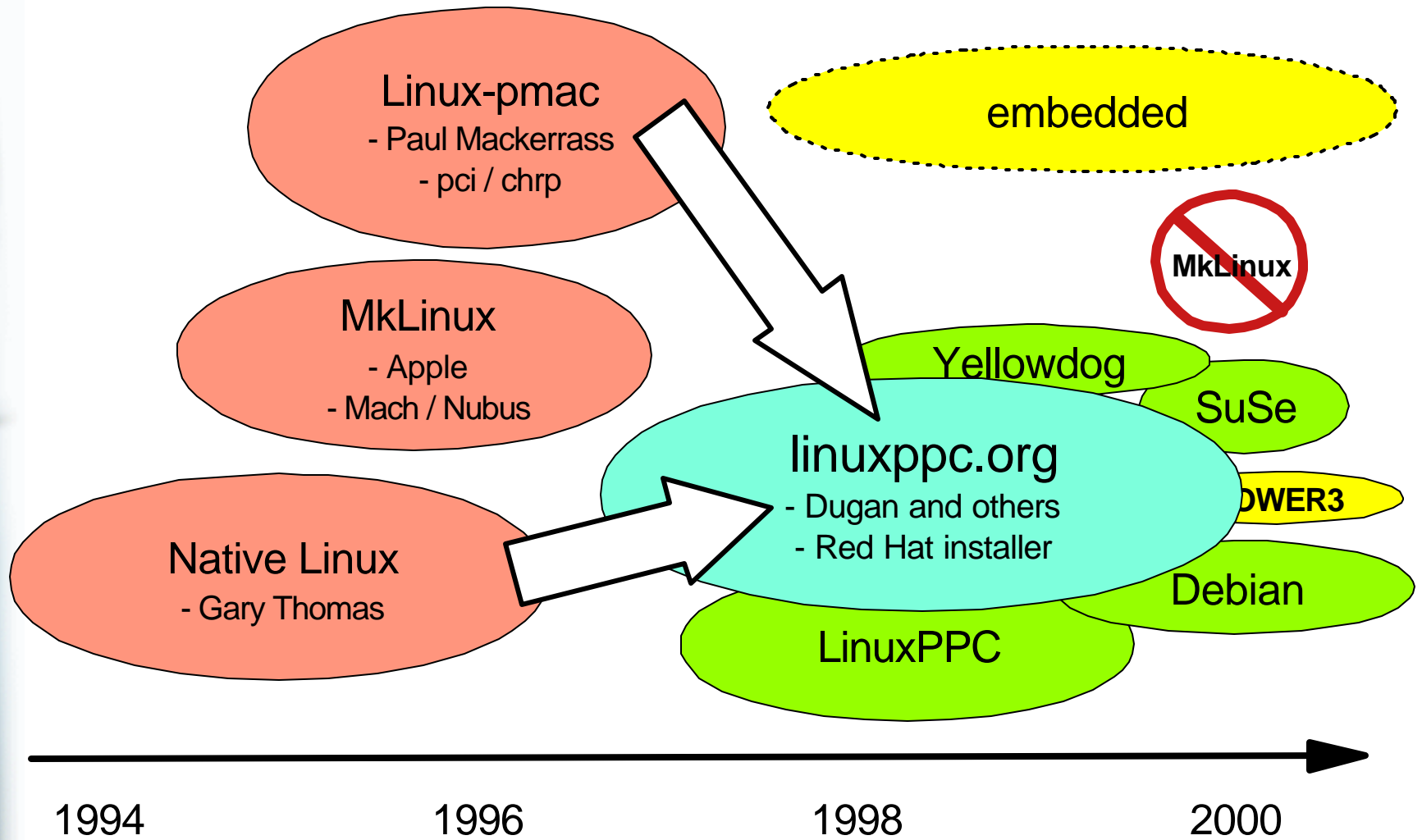


IBM Involvement in PowerPC Linux

- Help and grow PowerPC Linux Community through commercial and technical interests.
- Technical focus areas:
 - Enable Linux on enterprise servers
SMP, 64-bit PPC, LPAR etc.
 - Address data integrity issues
Identify known problems regardless of field occurrences.
 - Consider alternative memory management implementations
- IBM commercial interests:
 - RS/6000 and AS/400 servers
 - PowerPC clusters
 - Embedded microprocessors
 - PowerPC Open Platform



PowerPC Linux History





PowerPC Linux Maintenance

- Bugs and patches reported on Source Forge

<http://sourceforge.net/projects/ppclinux>

- Source maintained in bitkeeper

<http://www.fsmlabs.com/linuxppcbk.html>

- IBM PowerPC project

<http://oss.software.ibm.com/developerworks/opensource/projects/ppc>

- Email lists

<http://lists.linuxppc.org>





PowerPC Linux Scales to all Platforms

Embedded

Desktop and
Small Server

Enterprise
Servers





Classifying PowerPC Linux

- By processor family

```
choice 'Processor Type' \
    "6xx/7xx/7400          CONFIG_6xx      \
    4xx                    CONFIG_4xx      \
    POWER3                 CONFIG_POWER3   \
    POWER4                 CONFIG_POWER4   \
    8260                   CONFIG_8260    \
    8xx                    CONFIG_8xx"
```

- By system architecture

- prep, chrp, powermac, mtx, etc

- By manufacturer

- Apple, IBM, Motorola, Bull, etc.

- By use:

- embedded, game, desktop, server, enterprise server

- By Distribution





PowerPC Linux Distributions

- LinuxPPC
- Yellowdog
- SuSE
- Debian

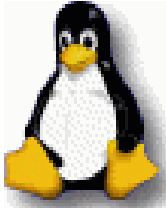
- Rock Linux
- Turbo Linux

Note: *All distributions are Linux 2.2 based.*

None support POWER3 at this time.

Several plan support with their 2.4 distribution.

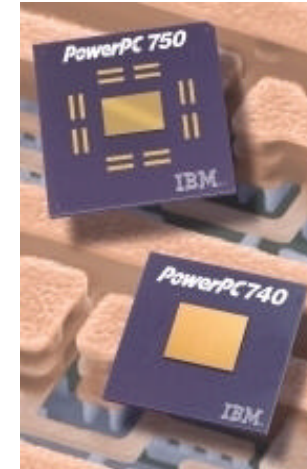




405GP embedded PowerPC

- Integrated PCI, Ethernet, and SDRAM controller

750 and 740 PowerPC

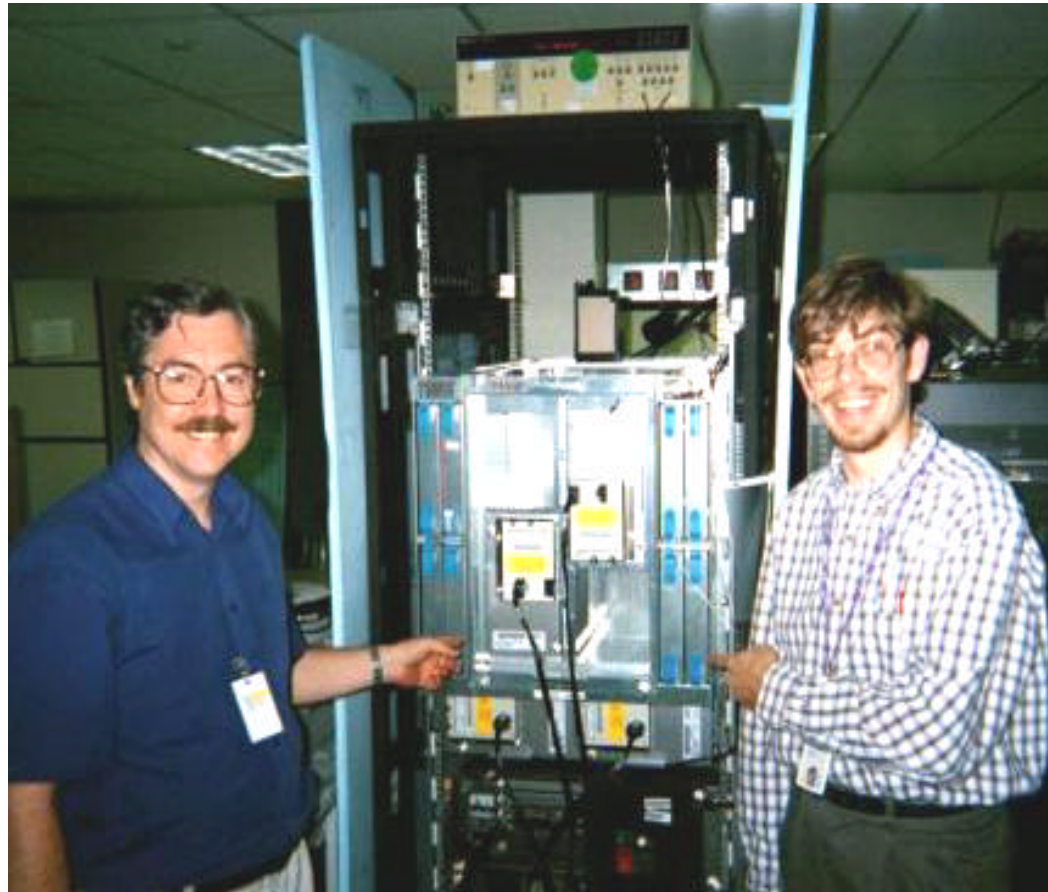


<http://www.chips.ibm.com/products/powerpc/linux>





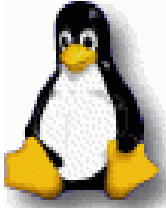
Experimental POWER4 running Linux



Paul Mackerras
Linuxcare

Tom Gall
IBM Linux Technology Center





PowerPC Linux Immediate Focus

- stability in 2.4 kernel
- support multiple PCI busses
- device drivers
 - large storage systems
 - Fiber channel arrays
 - communication
 - HiPPI
 - Myrinet
 - graphic cards
- himem
- less than and equal 8-way SMP scaling
- consolidated binaries for distributions

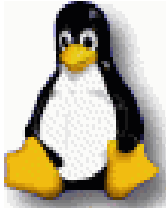




Device Drivers Issues

- Endian neutral
- May need to be more SMP aware . . .
- Minor concerns with x86 specif display adaptors
 - may need PPC specific initialization





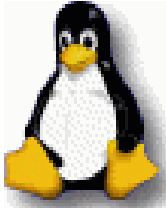
POWER3 and POWER4 Cache Line Size

- PowerPC Linux assumed 32 byte cache line for memset
- POWER3 and POWER4 have 128 byte cache line
- Affects user mode instructions like dcbz.
- Required changes in:
 - kernel
 - glibc
 - statically linked apps (eg. distribution installers)
- Use `CACHE_LINE_SIZE` and `LG_CACHE_LINE_SIZE` macros

```

#if defined(CONFIG_4xx) || defined(CONFIG_8xx)
#define CACHE_LINE_SIZE          16
#define LG_CACHE_LINE_SIZE       4
#elif !defined(CONFIG_PPC64BRIDGE)
#define CACHE_LINE_SIZE          32
#define LG_CACHE_LINE_SIZE       5
#else
#define CACHE_LINE_SIZE          128
#define LG_CACHE_LINE_SIZE       7
#endif /* CONFIG_4xx || CONFIG_8xx */

```

RS/6000 Model 260 Running Linux



First 64-bit PowerPC running Linux

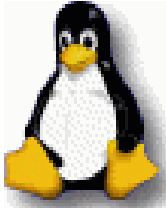




Power3 Linux Models

- RS/6000 Model 260
- RS/6000 Model 170
- RS/6000 Model 270
- Winterhawk II SP node
Not the SP switch





POWER3 Configuration

- Linux 2.4 only, 2.4.0-test7 works
- Config options
 - CONFIG_EXPERIMENTAL
 - CONFIG_PPC
 - CONFIG_POWER3
 - CONFIG_PPC64BRIDGE
 - CONFIG_ALL_PPC
 - CONFIG_SMP
- Some options we tested and used that apply to clusters
 - CONFIG_ROOT_NFS
 - CONFIG_IP_PNP
 - CONFIG_SERIAL_CONSOLE
- Some RS/6000 POWER3 features
 - Service processor
 - nvr-am-based system LED
 - Remote power-up
 - chrp (See OF device tree in /proc/device-tree)



PowerPC Linux Future Directions

- 64-bit kernel
 - POWER3 and POWER4
- Logical Partitioning
- Large n-way SMP scaling
- Memory management
 - *Concern: IA32 assumptions in architecture independent source*
- Multiplatform management
 - intelligent boot loading (yaboot)
 - increased use of RTAS and open firmware
 - configuration and source code management
 - bitkeeper and source forge
- PowerPC Open Platform (POP)
 - Low cost appliance standard