Enabling trust in commodity components

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Company & Products

Jaluna – The Company

- Created in August 2002
- Spin-off from Sun Microsystems by former Chorus Systems founders:
  - 20+ recognized system software engineers
    - Average of 10+ years in the team (no turn-over)
  - Invented Chorus "Microkernel" operating system architecture
    - Millions of units deployed in telecom networks worldwide
  - Carrier-Grade High-Availability experts
- Supported by key customers

Customers and Partners

- Customers
  - Manufacturers of:
    - Network equipment
    - Mobile phones
    - Printers
    - Routers
- Partners
  - Distributors and VARs
  - ISVs
  - IHVs


Empowered by Innovation

Industry Awards

- "Electron d'Or" award for best embedded software product in 2003
- Capital-IT "Best IT company" award", April 2003
  - Supported by AFIC, VCs, and several public investment groups

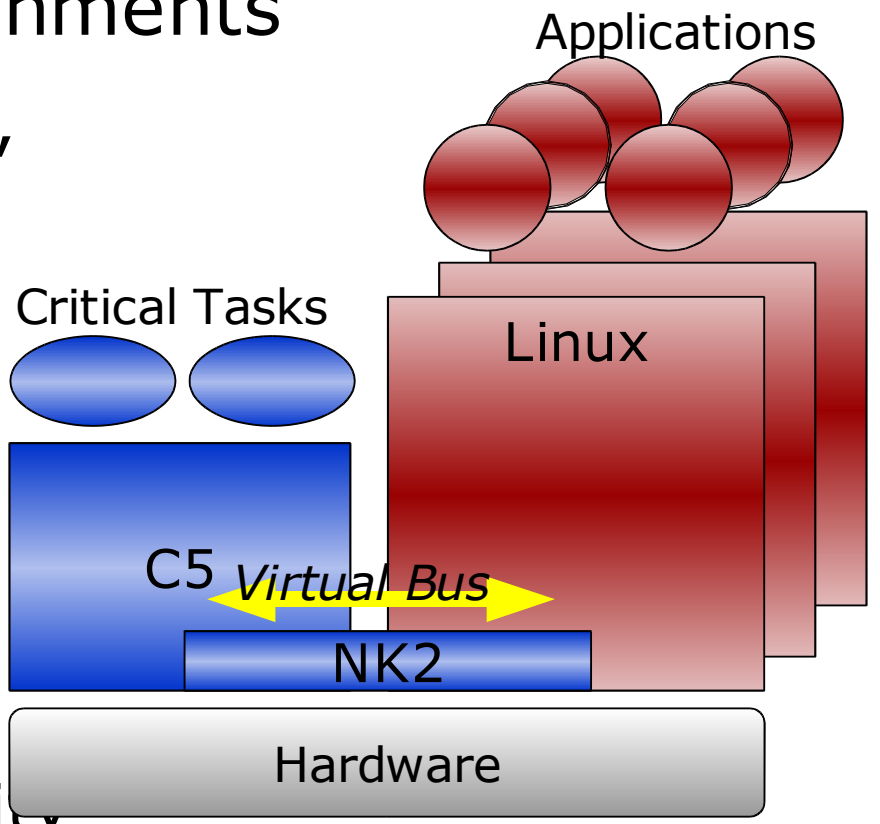
- Jaluna listed in "Tornado 100", June 2003
  - Top 100 emerging IT and Biotech companies in Europe
  - By industry analysts (Tornado Insider magazine)

Key Market Trends

- Convergence of telecom, datacom and web services forces historical manufacturers to open up their products
- COTS solutions (Linux) replace in-house developments made by internal team
- Growth of e-business requires real-time, reliability and trust in the network infrastructure
  - Billions of dollars are invested in this infrastructure and billions of dollars rely on it

Jaluna Technology & Components

- Jaluna provides a partitioning and virtualization solution enabling dependable systems with standard Linux environments
  - Resources are dedicated to, or shared between, several OS instances
  - Critical and legacy tasks co-exist with a general purpose computing environment
  - Critical tasks enable QoS, high-availability, and security



Jaluna Value Proposition

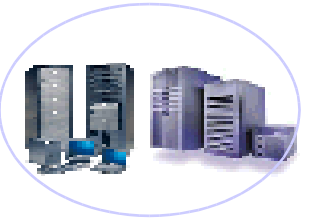
- Software approach to
  - Help introduce openness (Linux) in proprietary systems
    - Roadblock to company strategic evolution
  - Help protect IP and innovation in open systems (Linux)
    - Quality of Service, system availability, security
- Cost effective ("Several in One")
  - Less hardware, less power consumption, less space
- Performance
  - Overhead to native implementation <5%

Target Markets

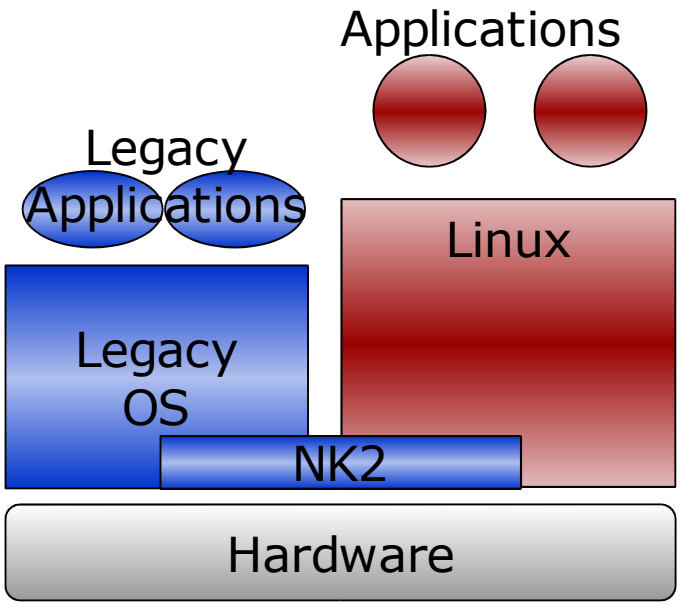
- Telecom & network infrastructure manufacturers

- Device manufacturers

- System on Chip manufacturers
- Computer manufacturers

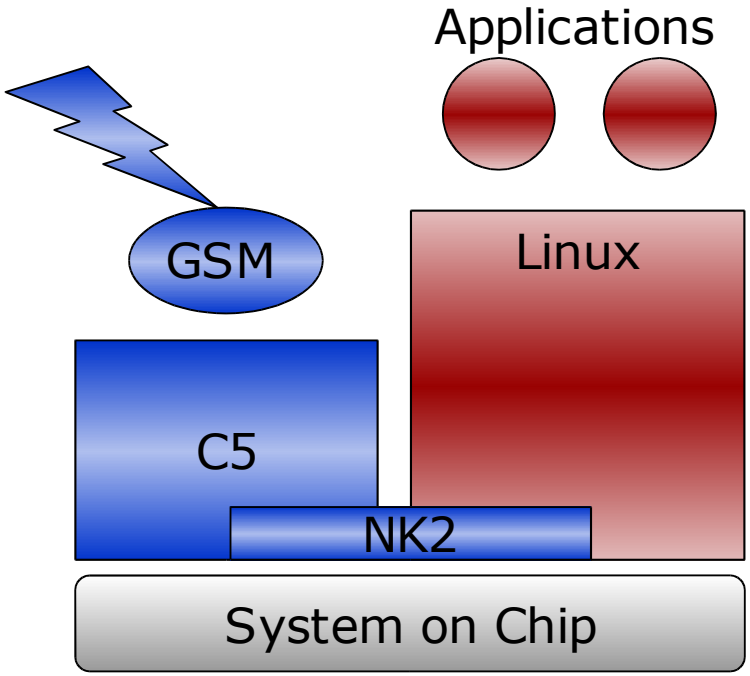


Use Case: Migration to Linux



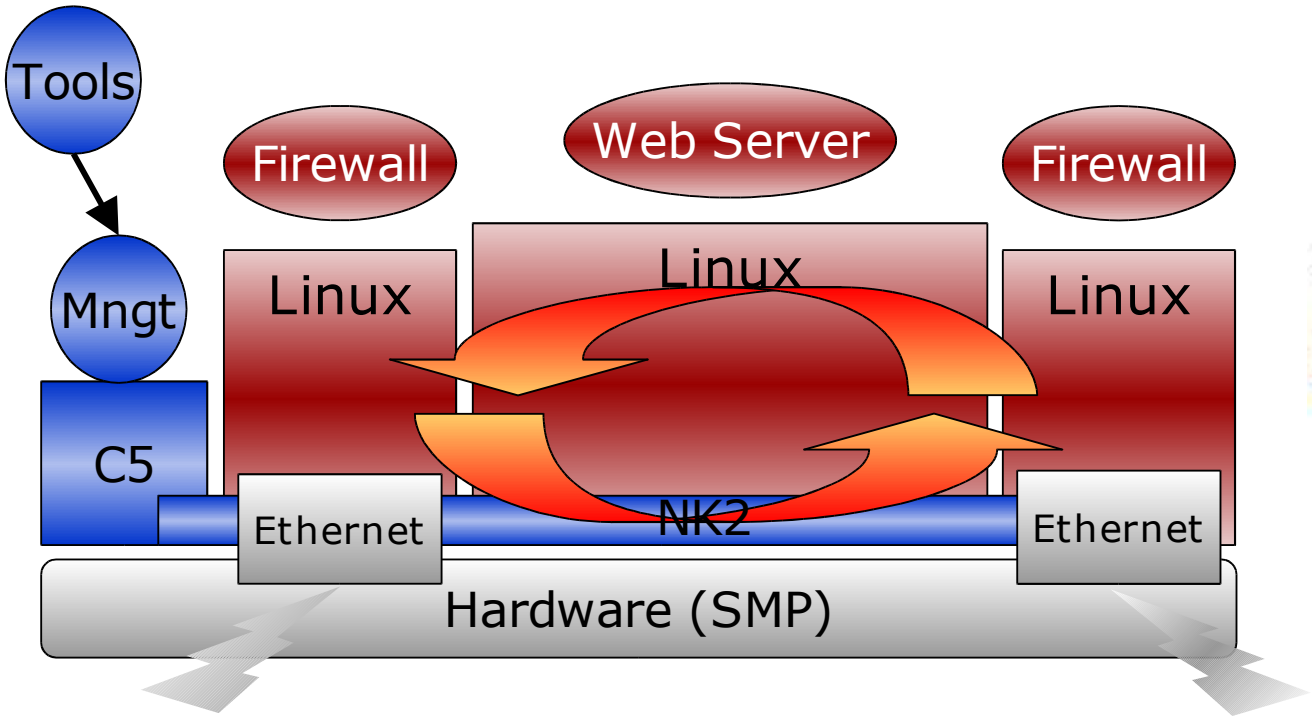
- Resources are distributed and/or shared between Legacy OS and Linux
- Legacy applications run on legacy OS
- New applications run on Linux

Use Case: Connected Device

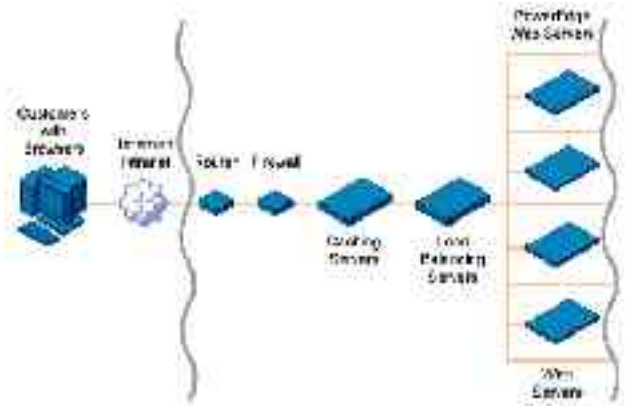


- Critical protocols are supported by a Secure RTOS
- General purpose applications run on Linux
- System on Chip capabilities are distributed among best suited operating environments

Use Case: Server Consolidation



DMZ



- Distribution of processors and devices among Linux instances (possibly with virtual clustering)
- Firewalls and Web Servers run on separate Linux instances
- Configuration & management are handled as critical tasks

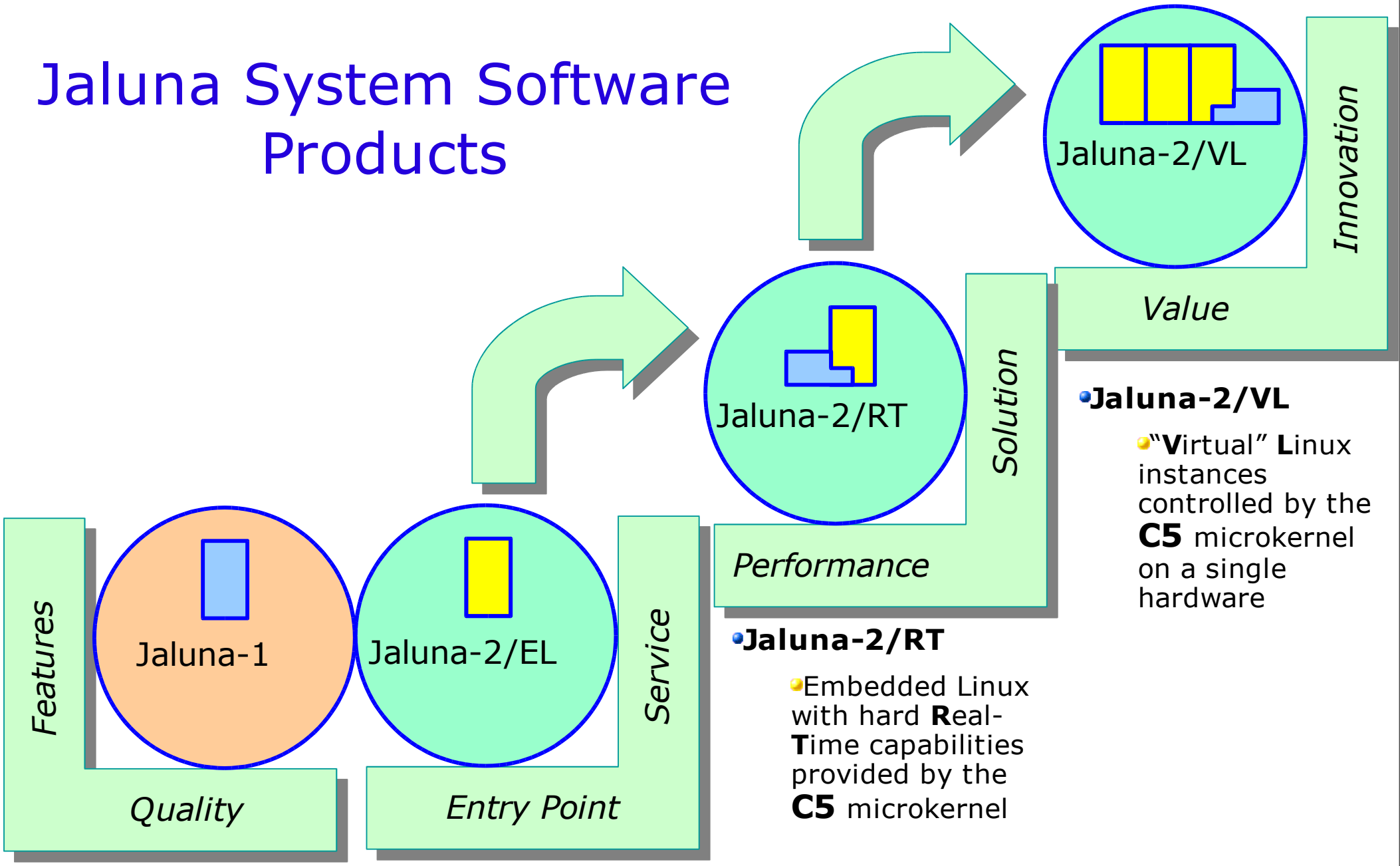
Jaluna Business Model

- Jaluna – Open source -> Developers
  - Engineering community
  - Partnerships with Universities and Research Labs
- Jaluna – "Carrier-Grade Edition" -> Industry
  - Validated, integrated and supported packages
  - Sources and binaries
  - Extended support with guaranteed problem resolution time
  - Royalty free
  - Product subscription model
- Professional services, consulting, training

Product Subscription

- Annual per-developer fee for:
  - Product SW (binary and source) + documentation
    - For one target CPU family (x86, PPC, SPARC, MIPS, ARM, ...)
    - Including all BSP and drivers for that family
  - Development tools on Linux/PC and Solaris/SPARC hosts
  - Rights to develop multiple products with royalty-free deployments
  - Unlimited help desk support
  - Maintenance (bug fixes and maintenance releases)
  - Training
- Subscription price decreases as the number of developers increases

Jaluna System Software Products

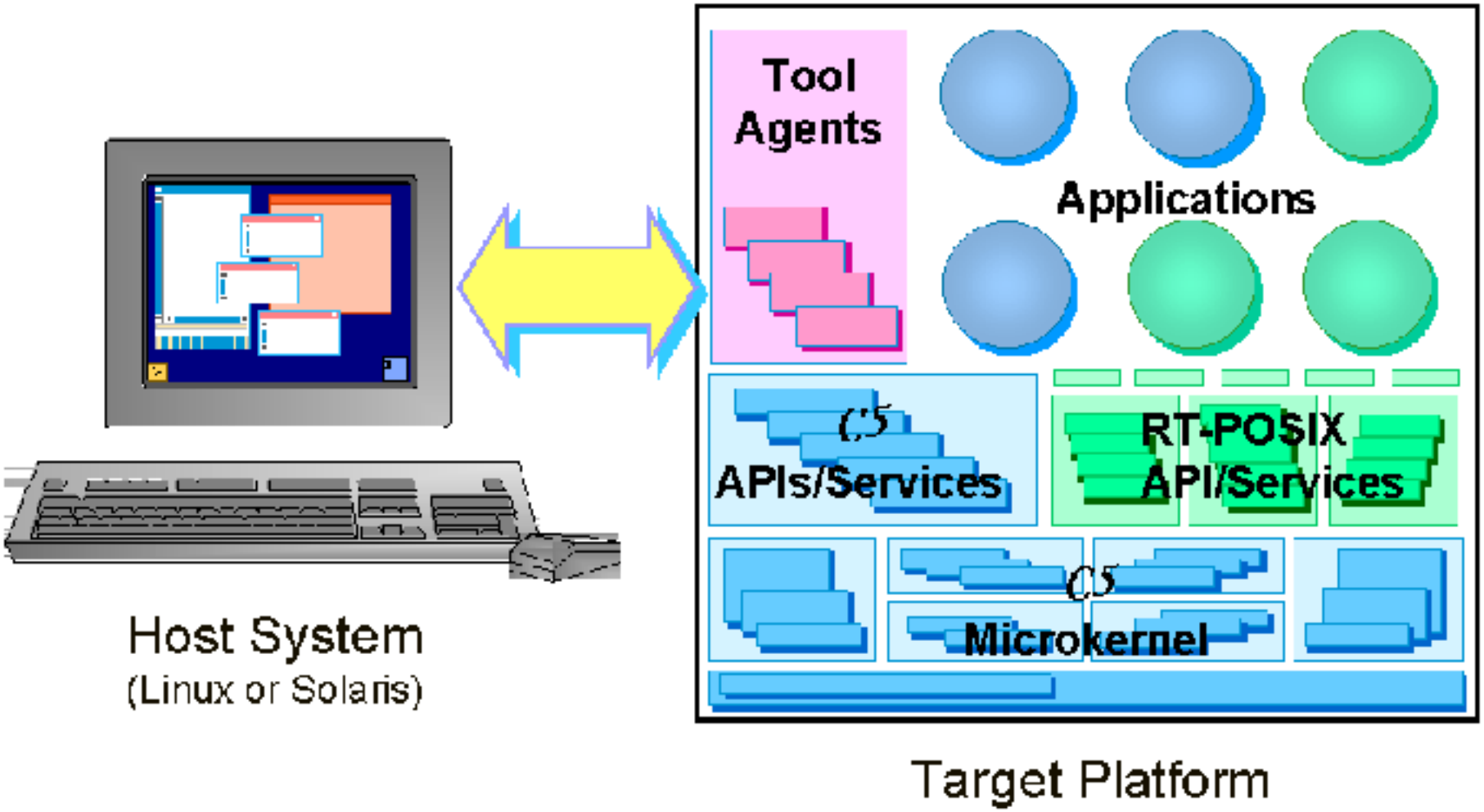


- **Jaluna-2/VL**
  - "**V**irtual" **L**inux instances controlled by the **C5** microkernel on a single hardware
- **Jaluna-2/RT**
  - Embedded Linux with hard **R**eal-**T**ime capabilities provided by the **C5** microkernel
- **Jaluna-1**
  - Royalty Free **RTOS**
  - Access to Source
- **Jaluna-2/EL**
  - Stand-alone **E**mbedded **L**inux

Jaluna-1 – Carrier-Grade RTOS

- *C5* microkernel (5th generation Chorus)
- Real-Time POSIX services
- High availability enablers
- Host-target development, deployment, and management environment
- Carrier-grade quality
- First class documentation

Jaluna-1 – Carrier-Grade RTOS

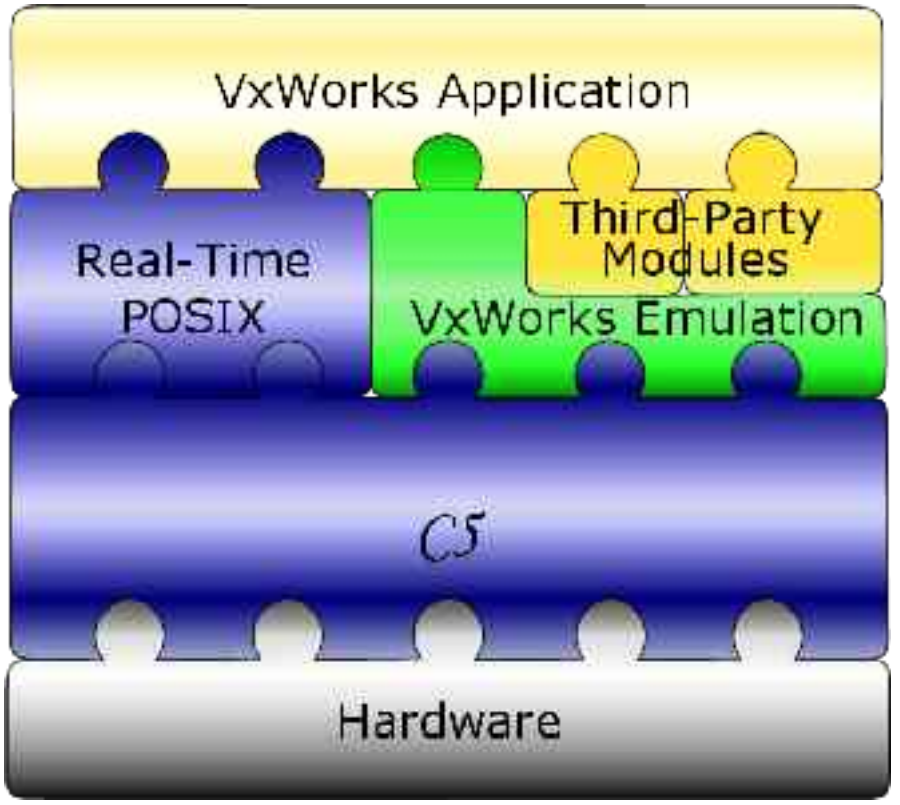


Jaluna-1 Features

- Real-time performance for critical applications
- Configurable (small/medium/large systems)
- Future generation networks ready (IPv6)
- Transparent and reliable inter-process communications (Chorus IPC)
- Several memory protection models
- Supervisor & user execution models
- Support Java Applications (J2ME)
- IA32, PPC, ARM & MIPS target processors

Jaluna VxWorks Compatibility Kit

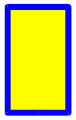
- Enables manufacturers and integrators to reuse previously developed code on Jaluna's open source royalty free real-time operating systems
  - Real-time behavior of VxWorks is preserved
  - RT-POSIX API is available for VxWorks applications
  - Reuse of VxWorks drivers



VxWorks is a registered trademark of Wind River Systems Inc.

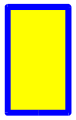
Jaluna-2 Product Family

- Linux is the common denominator
  - Linux Standard Base (LSB)
  - Embedded configuration
  - Host-target development & installation
  - IA32, PPC & ARM target processors
- Hard real-time as a plug-in
- Scalability, availability, and security *enabling* architecture



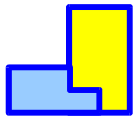
Jaluna-2/EL

- Stand-alone embedded Linux
  - Configurable memory footprint
  - Soft real-time
- Target:
  - Low-cost embedded devices (eg. Set-top boxes)
  - Basic customer premises equipment
  - Communication infrastructure devices (eg. routers)



Jaluna-2/EL Features

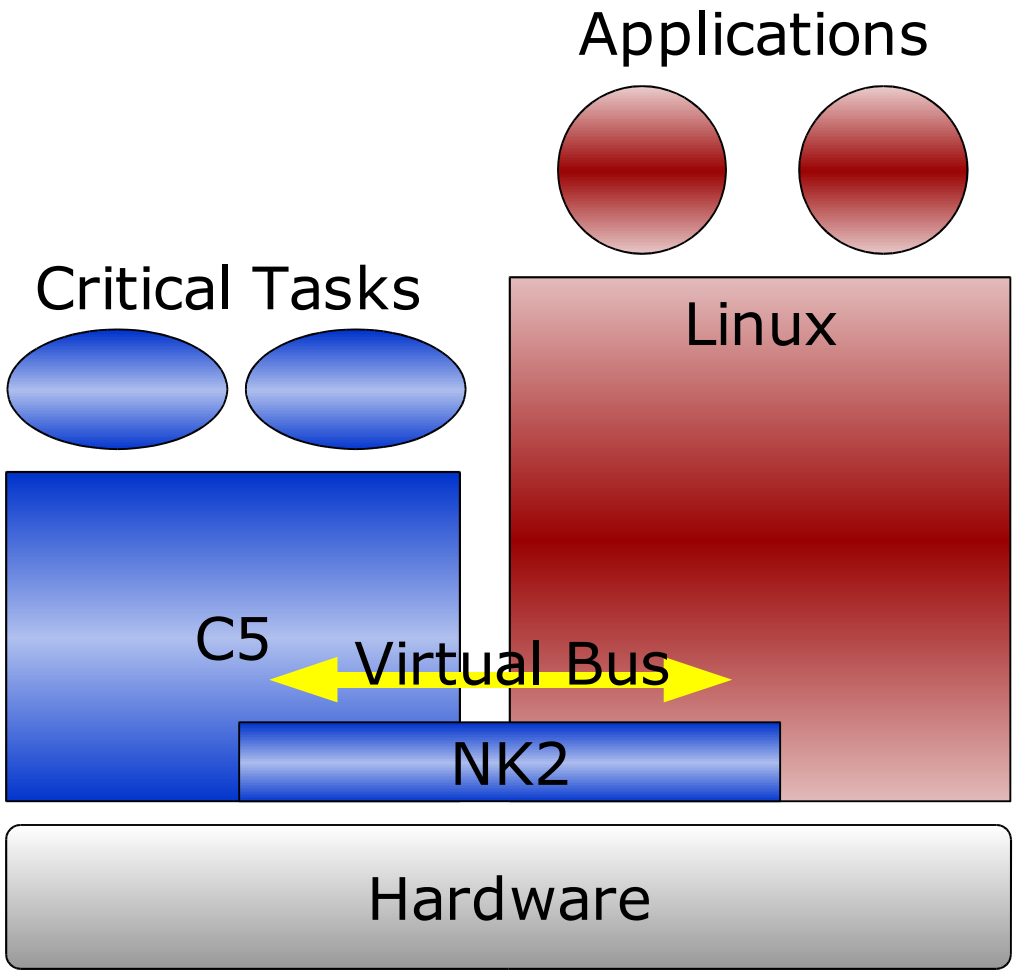
- Embedded Linux distribution
- Linux Kernel 2.4.20
- Standard APIs for application and kernel module development
- Real-time patches
- Native target development environment packages
- Host-target integrated development environment
- Configuration utilities

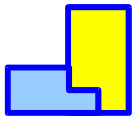


Jaluna-2/RT

- Host-target standard Linux distribution extended with Jaluna components
- *C5* real-time microkernel
- Enables critical added-value in a standard Linux environment
  - Real-Time, High Availability, Security
  - No modification to Linux kernel
  - No licensing dependencies

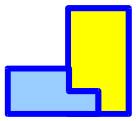
Jaluna-2/RT Components





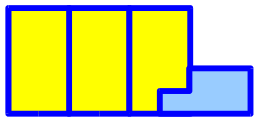
Jaluna-2/RT Execution Model

- Critical services run on *C5*
- General purpose applications run on Linux
- *C5* and Linux are coupled with efficient communication services (~ virtual bus)
  - Asynchronous
  - Reliable
  - Message based



Jaluna-2/RT Features

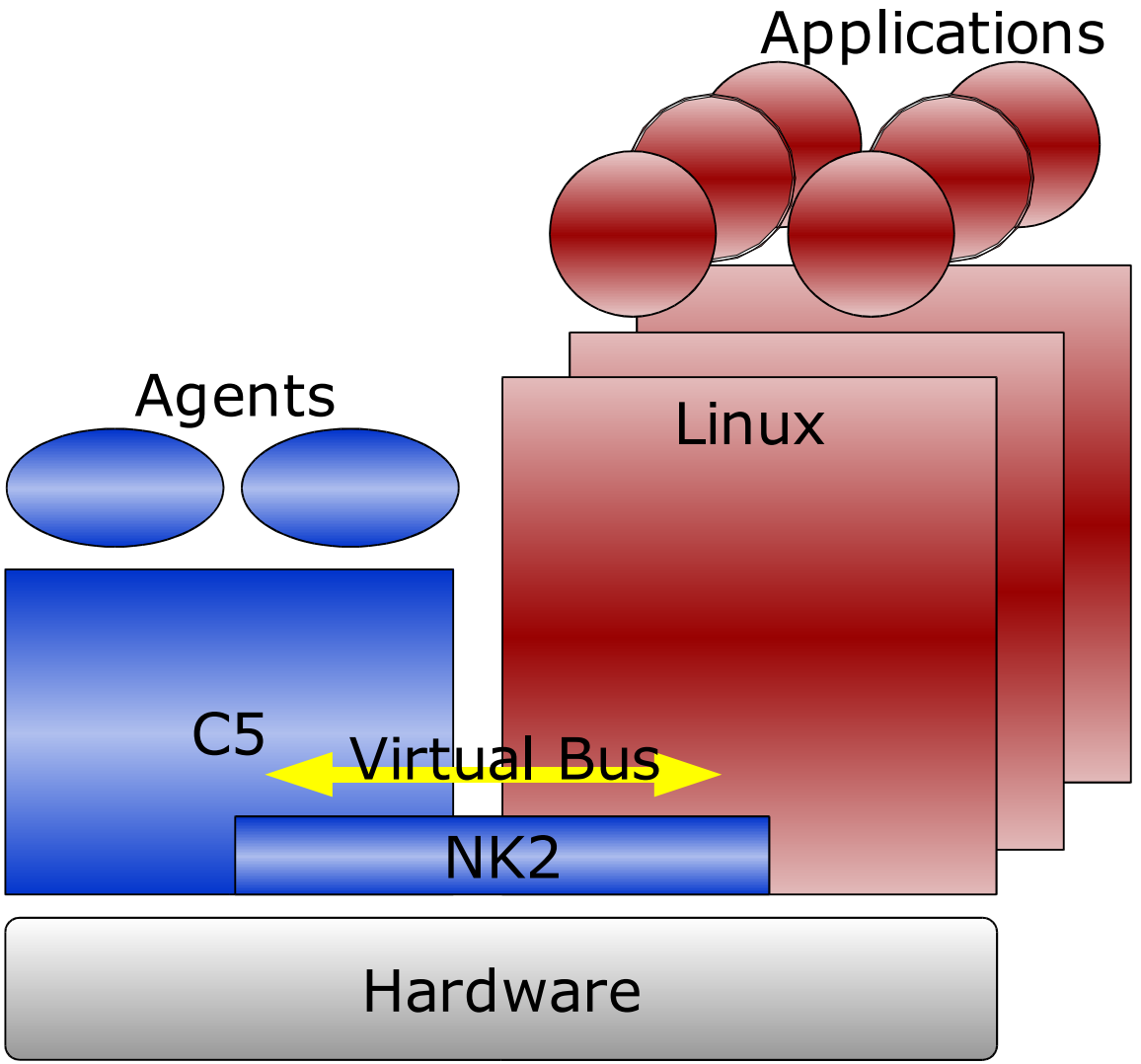
- Linux and *C5* use their own scheduling, drivers and memory management
- Linux and *C5* mutually protected
- Use *C5* drivers from Linux via proxy (Ethernet)
- High availability extensions
- Full cross development environment:
  - Root file system
  - Linux packages cross-installation (RPM based)

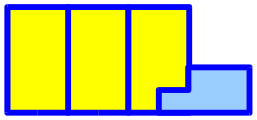


Jaluna-2/VL

- Multiple Linux instances on a single hardware
  - Separate instances with different computing purposes
  - Identical instances for hot-standby redundancy
  - Optimized space and power consumption
- Target:
  - Edge & core network infrastructure equipment
  - Shared among multiple Service Providers

Jaluna-2/VL Components





Jaluna-2/VL Features

- Memory protection between Linux instances
- Linux instances communicate using virtual IP
- Resources partitioning
- Device sharing (Ethernet, serial line)
- Device bound to a Linux instance (disk)

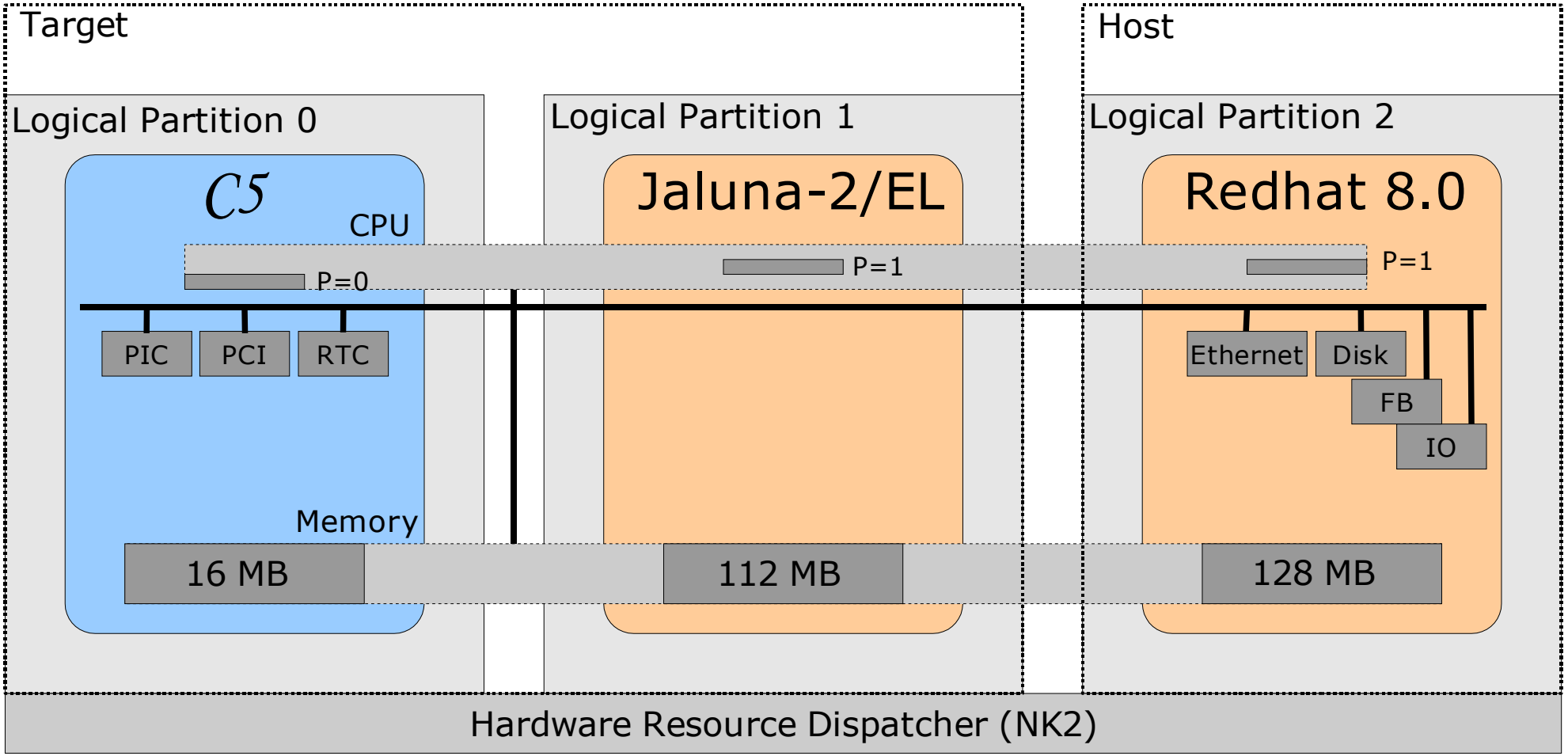
Jaluna

Jaluna-2 Demo

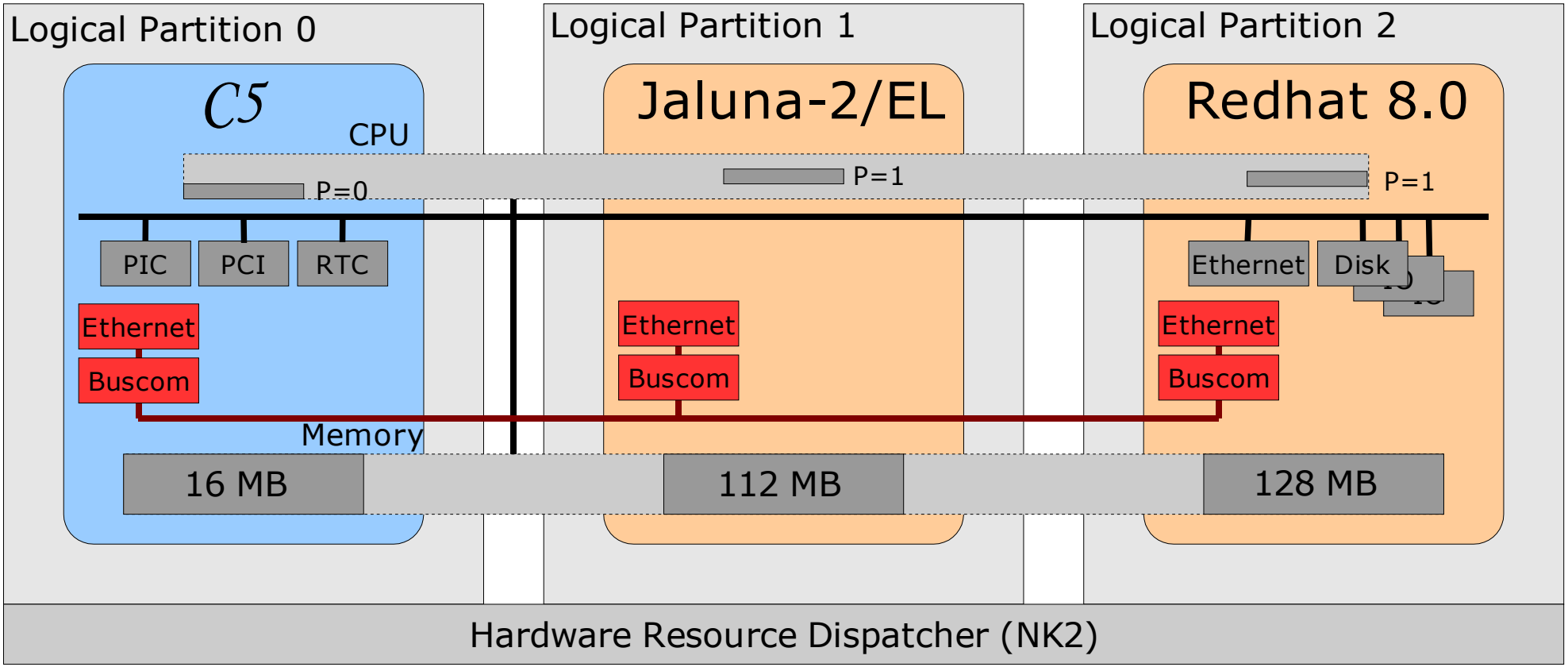
Hardware Configuration

- Dell Inspiron 4150
  - Intel Pentium 4 Mobile 1.7 GHz
  - 256 MB RAM
  - 30 GB Hard Disk
  - ATI Radeon 7500

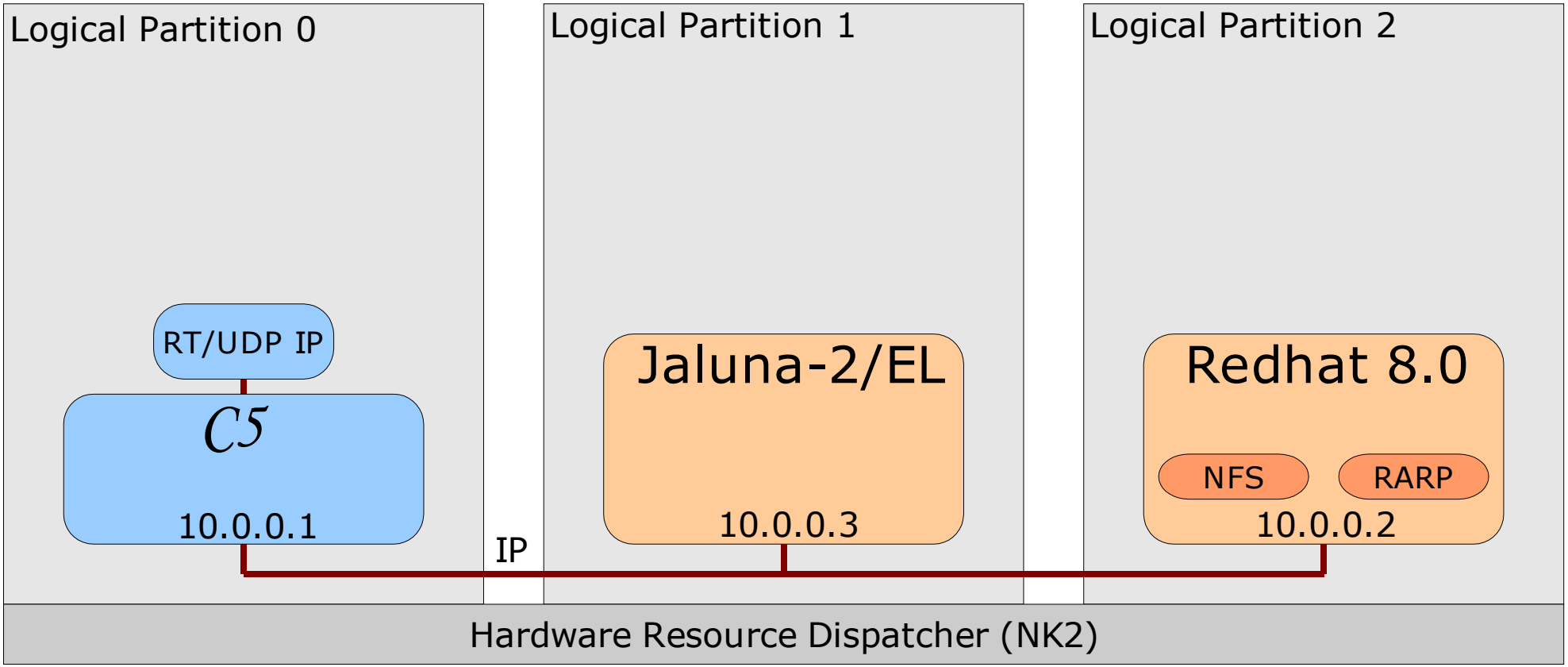
Logical Partitioning



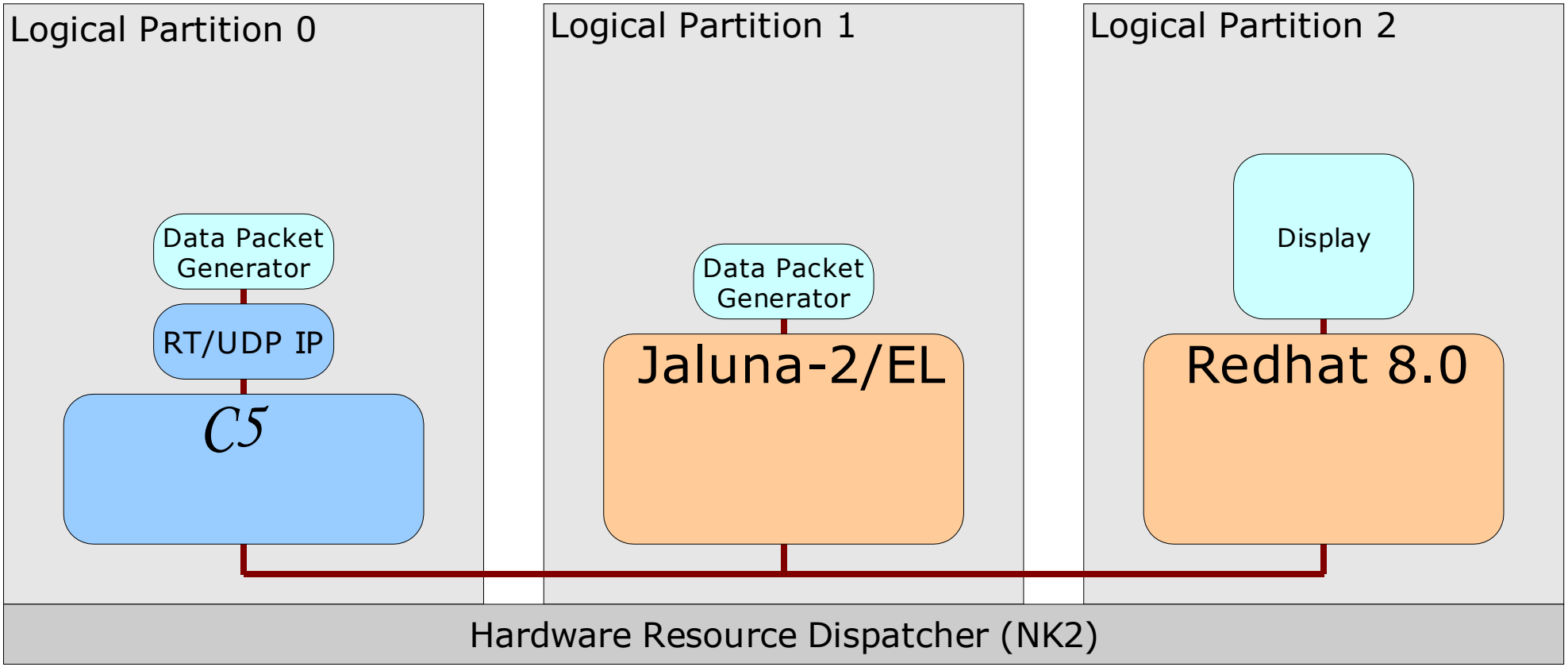
Virtual Bus



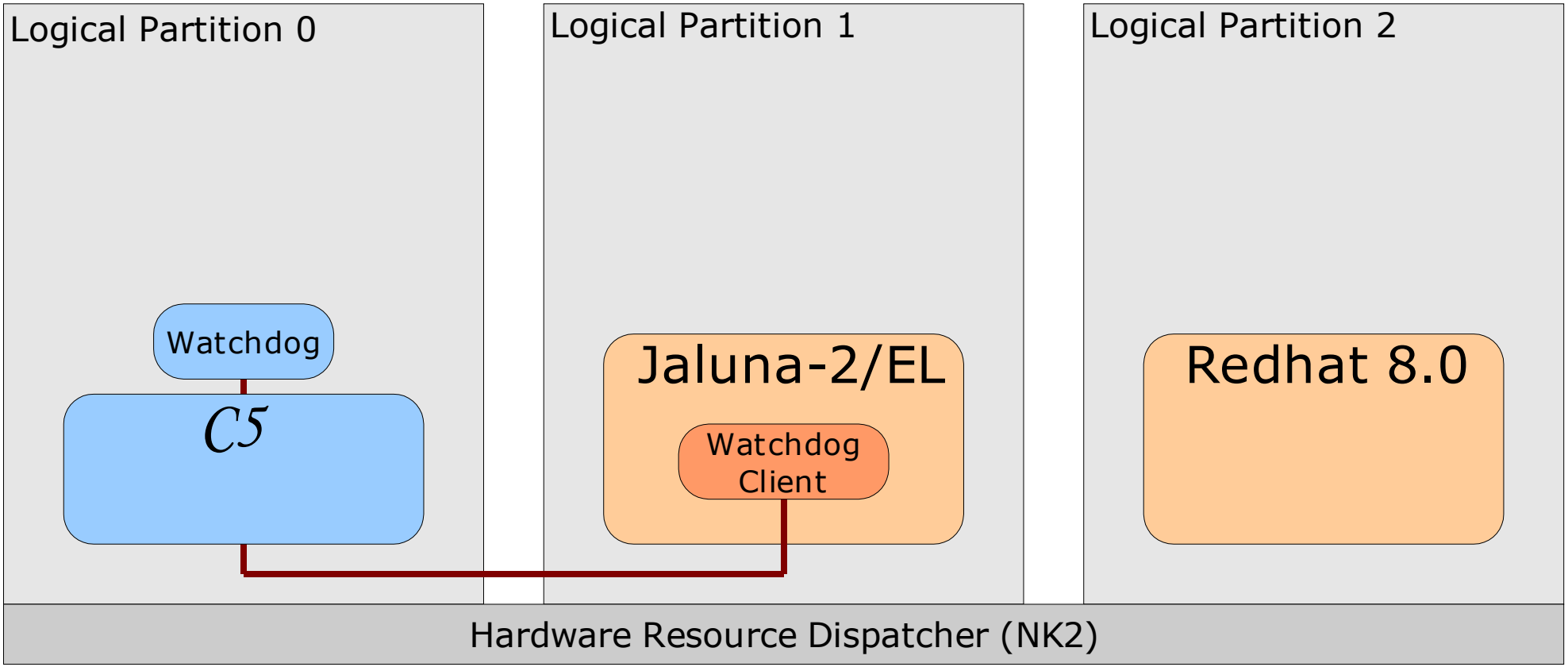
Software Configuration



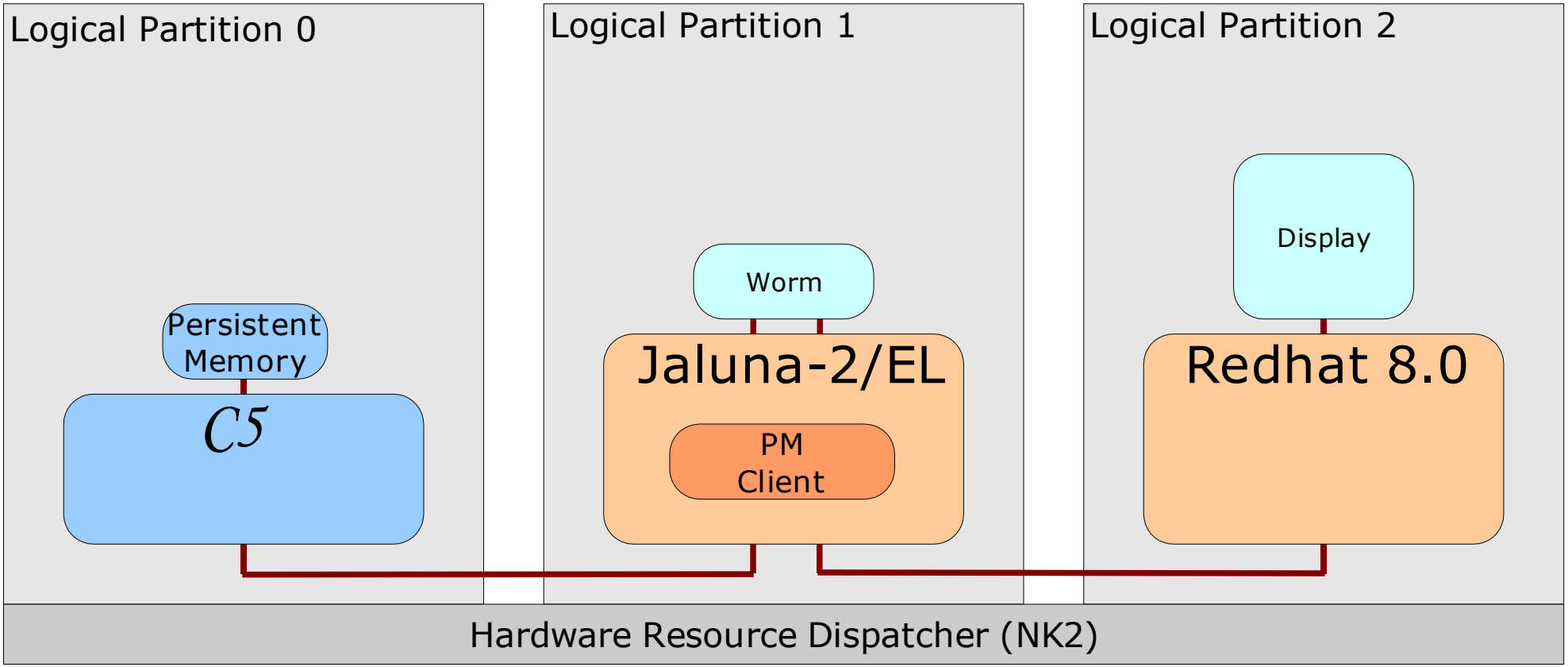
Real-Time Networking



Availability – Linux Monitor



Availability – Persistent Memory



Summary

- Jaluna develops and markets value-added software components and services that allow manufacturers to:
  - Migrate to open environment while preserving legacy investments
  - Introduce proprietary IP in products based on open software
  - Reduce costs by optimizing use of hardware resources
- A long standing team with
  - Proven international experience
  - 20+ renowned world-class system software experts
- Business relationships with major industry players

Jaluna Benefits

- Lower costs
  - Hardware: processors, memory
  - Software: royalty free
- Protection of customer IP
- Optimal performance
  - Immediate service availability
  - Predictable real-time behavior
  - General purpose applications
- Better Return on Investment
  - Re-use of applications and system components
    - From other environments (legacy, proprietary, open source)
    - From one product to another

Besoin d'Information ?

- Site web: http://www.jaluna.com
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Merci