

# Power

Everywhere™



## High-Performance PowerPC Technology Implemented in Embedded Environments

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IBM

THALES

## Power Architecture™ History of Innovation

**IBM POWER™**

**IBM PowerPC™**

- Over two decades of Industry-leading innovation in technology
  - 1981** – IBM invented RISC (Reduced Instruction Set Computing)
  - 1990** – IBM introduces RS/6000 Servers based on POWER (Performance Optimization With Enhanced RISC)
  - 1991** – PowerPC developed from POWER Processors
  - 1995** – 1<sup>st</sup> 64-bit Power Architecture processor
  - 1998** – Industry's first use of copper wiring interconnects
  - 1999** – Industry's first use of Silicon on Insulator
  - 2001** – IBM introduces the dual core 64-bit POWER4 processor
  - 2003** – IBM openly licenses the embedded PowerPC processor cores
  - 2004** – First in strained silicon SOI, with 90nm process

## IBM's Power Architecture™ Solutions

**Scalability: Servers, Workstations, PCs,  
Gaming Consoles, Routers, Automotive,  
Consumer**



Planned\*

IBM POWER™ Server Microprocessors

POWER2™

POWER3™

POWER4™

POWER5™

POWER5+™  
POWER6™

IBM PowerPC® Embedded Microprocessors

PowerPC 601

PowerPC 750

PowerPC 970

Next  
Generation  
Processor  
s

PowerPC® Licensable Processor Cores and Custom Solutions

PowerPC 401

PowerPC 405

PowerPC 440

New  
Licensees  
and Cores

\*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

## What is Power.org?

Is planned to be a collaborative community with the mission to develop, enable, promote, and help expand the open standards community around chips and systems which use Power Architecture technology.

Members intend to define open specifications related to Power Architecture technology, initially focusing on:

- Bus architecture
- Server platforms

 *Power.org should feel familiar to members of VITA. Perhaps we will join forces when appropriate, like today*

**Cadence  
Design Systems**

**Thales**

**IBM**

**Shanghai Belling**

**Culturecom**

**Jabil Circuits**

**Sony**

**Wistron**

**AMCC**

**POWER**

**Bull**

**Red Hat**

**Synopsys**

**Novell**

**Chartered  
Semiconductor**

**Tundra  
Semiconductor**

## IBM JS20 Blade Server, Based on Power Architecture

- **Some of the world's fastest supercomputers run on the JS20**
  - MareNostrum, Spain: Fastest supercomputer in Europe, #4 in Top 500
  - Seoul National University, Korea; 5 TFLOPs
  - Joint Supercomputing Center, Russia; 1 TFLOP
- **JS20 Speed Enhancement**
  - 40% faster processor than previous generation
- **Two 2.2 GHz PowerPC™ 970 processors, derived from the POWER4™ architecture**
- **Now supports AIX 5L V5.2 & V5.3, SUSE SLES 8/9 and Red Hat Linux AS V3**



- **Board, including connectors, is 241mm X 444mm, adapted for a data center**

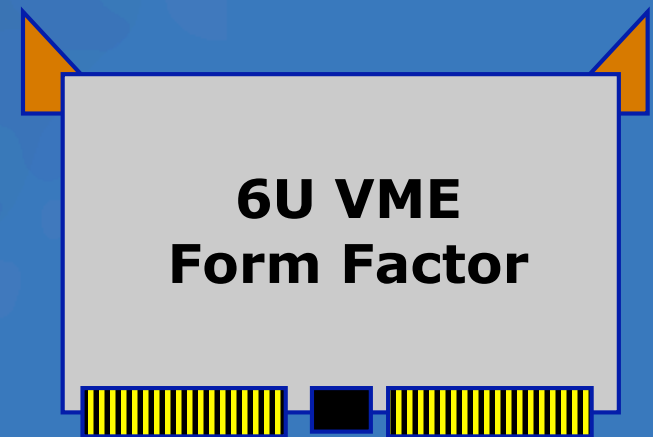
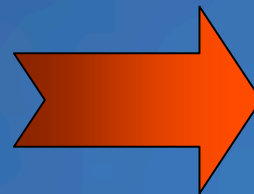
## Integrating Power Architecture in Embedded Mil/Aero



Sample Blade Server

From a Blade size (241\* 444mm) to a 6U form factor (233 \* 160mm)

Same architecture and performance class with full binary compatibility under Linux

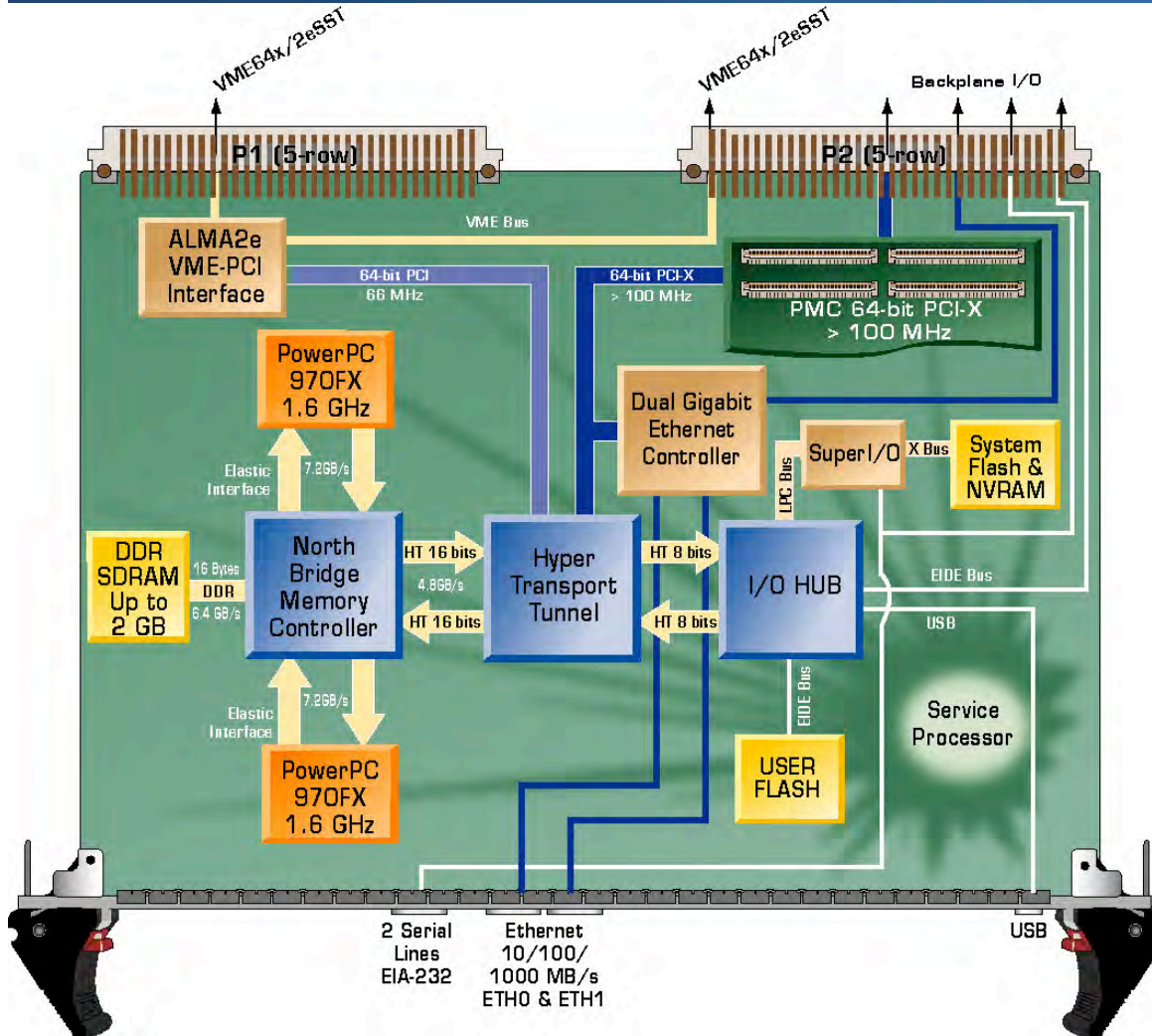


Challenges:

- Density: 2.9 times smaller
- Thermal environment
- Shock/vibration

## Example of Dual PowerPC 970 VME Architecture

Advantages for embedded market in a 6U VME form factor:



- High computing performance
- Server class memory and I/O bandwidth
- Easy/turnkey Linux SMP with the same Integrated development environment as blade servers
- Upward binary compatibility with PowerPC and AltiVec code
- RTOS for hard real-time
- Rugged conduction-cooled at lower frequency

## Integrating Power Architecture in Embedded Mil/Aero

- Key adaptations to mil/aero constraints:
  - Form factor from 241\* 444mm to 233\*160mm
  - Reduce power dissipation to accommodate lower thermal environment: de-rate frequency from 2.2GHz to 1.6 GHz
  - Increase shock vibration range: no Dimms, smaller compact design
  - Embeddability: Flash EEPROM added to allow standalone functioning and boot
  - VME 2eSST connectivity to foster VME legacy products and high performance
  - Control monitoring & health management with embedded  $\mu$ controller

Power Everywhere™

**THANK YOU**



Where COTS Meets Reality

[www.thalescomputers.com](http://www.thalescomputers.com)

The collage features a fighter jet in flight, a control room with multiple monitors, a space shuttle launching, a military aircraft on a runway, and several computer circuit boards and hardware components.