

# Linux on NUMA-Q

**Martin J. Bligh**

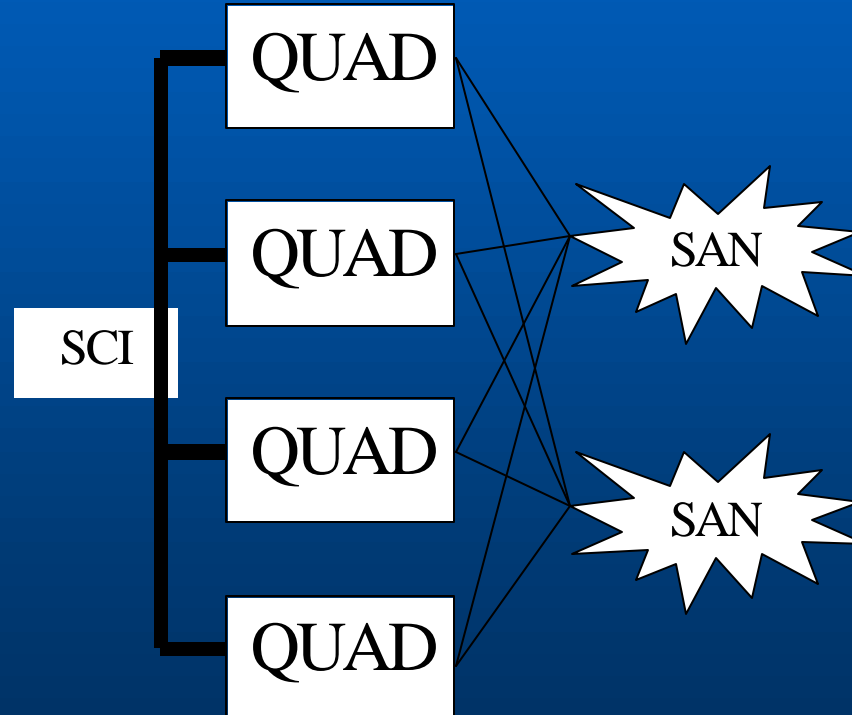
**IBM Linux Technology Center**

**Martin.Bligh@us.ibm.com**

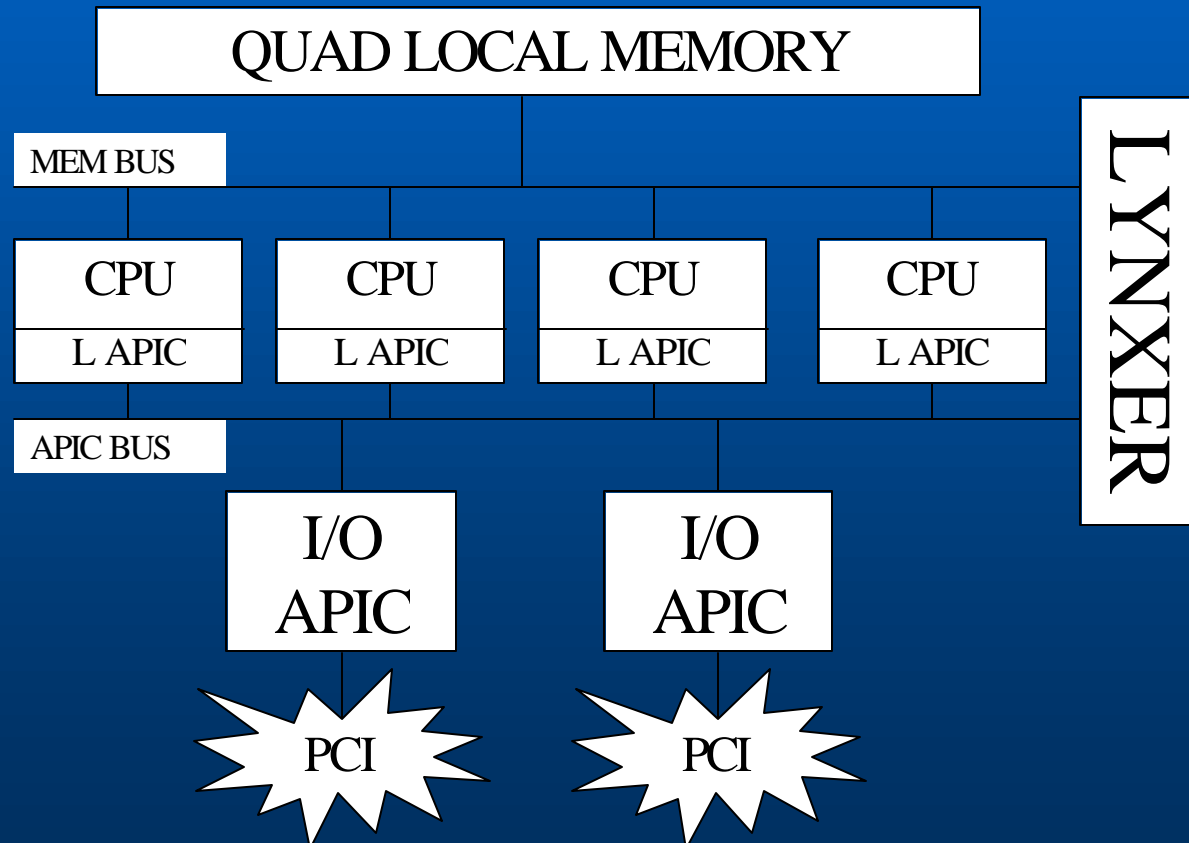
# Goals / Status

- **Linux on 32 CPU i386 NUMA platform**
- **Tested with 16 CPUs / 16Gb**
- **Boots and runs reliably**
- **No performance work yet.**
  - This is SMP, right?

# NUMA-Q architecture (system)



# NUMA-Q architecture (quad)



# APIC addressing modes

- Physical (4 CPUs)

□□□□

- Logical Flat (8 CPUs)

□□□□□□□□

- Logical Clustered (60 / 64 CPUs)

□□□□ □□□□

# Bootstrap.

- **Why INIT, INIT, Startup doesn't work**
- **What the lynxer does for us**
- **Booting via NMI**
- **Problems?**

# Remote memory access (MMIO / portIO)

- Remote memory access - transparent
- Per quad cache & per CPU cache
- Latency ratio 10:1

# The future

- **Bigger**
  - 60 / 64 CPUs
- **Faster**
  - Local memory Allocation
  - Replication / Migration
  - Scheduling
- **Better**
  - Init 6
  - Initialise non-primary busses