Remapping of a Reconfigurable Generic Search DSP (RGSD) and a Generic Air Track Processor (GATP) to Multicore Technology with Linux SMP

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# Project Overview

## Objectives:
- Conduct feasibility study of Linux-based Multicore embedded processing as a replacement for previous generation single core VxWorks-based processors
- Leverage existing software on Multicore processors with MPI and VSIPL standards
- Validate key benefits of Multicore processing: Code reuse, reduced development efforts, and rapid technology insertion into a variety of live radar applications

## Team:
- Lockheed Martin – Radar Design Agent and System Integrator
- CSP Inc. - COTS Hardware supplier and Development Partner

## Responsibilities:

**Lockheed Martin**
- Develop the hardware / software architecture
- Define target radar characteristics and provide specifications, Matlab models and interface requirements
- Conduct integration and test activities

**CSP Inc.**
- Provide equipment and development environment training
- Provide hardware and software development environment
- Provide development support
Existing RGSD/GATP System Configuration (Single Core)

Solaris Workstation (Sun Ultra10)

Windows 2000 Workstation

10/100 Ethernet Switch

LAN/SAN Switch

From Search

Adapter Box

2814 I/O Bridge w/ Egress RIC PMC and Myrinet 2k SAN/PMC (64/33)

2814 I/O Bridge w/ Ingress RIC PMC and Myrinet 2k SAN/PMC (64/33)

4 SBCs (2814) Modules
2 Dual PPCs (2923) Modules
6 Quad PPC (2841) Modules

12 Modules
3 Module Types
21 Slot Chassis

Legend

Myrinet-2000 2K SAN
RS422 Ribbon
10/100 Ethernet
RS422
Search (RGSD)
Track (GATP)

From/To Track and WCP

2923 Dual I/O Bridge w/ Ingress RIC PMC

2814 I/O Bridge w/ Technobox Digital I/O PMC and Myrinet 2k SAN/PMC

UNCLASSIFIED
Proposed RGSD/GATP System Configuration (Multi-core)

Legend:
- Myri-10G
- RS422 Ribbon
- 10/100 Ethernet
- RS422
- Search (RGSD)
- Track (GATP)
- Unused

6 Dual PPC (3120D) Modules
6 Modules
1 Module Type
8 Slot Chassis

Solaris Workstation
StarGate Dual PPC Module
10/100 Ethernet Switch
Windows Workstation

Solaris Workstation
Windows Workstation
10/100 Ethernet Switch

LAN/SAN Switch
StarGate Dual PPC Module with RIC PMC
StarGate Dual PPC Module
6 Dual PPC (3120D) Modules
6 Modules
1 Module Type
8 Slot Chassis

Legend:
- Myri-10G
- RS422 Ribbon
- 10/100 Ethernet
- RS422
- Search (RGSD)
- Track (GATP)
- Unused

StarGate Dual PPC Module with RIC PMC
StarGate Dual PPC Module with RIC PMCs
StarGate Dual PPC Module with Technobox Digital I/O PMC
VXS-M16 Switch

From Search To WCC Display
Adapter Box

From/To Track and WCP
Adapter Box
Project Summary

• Preliminary study validated benefits of Linux-based Multicore architecture
  • Single processor module type and reduced module count
  • Reduced platform footprint with smaller chassis
  • Easier to maintain
  • Reduced cost for acquisition/life cycle and development efforts
  • Cost savings of 38%

• RGSD & GATP will be leveraged for future radar programs
  • Addresses high production cost of current systems by replacing legacy equipment with single module type and small chassis
  • MPI- and VSIPL-based OA design provides the ability to easily enhance or modify system operation without the need for major redeligns
  • Scalable and reusable signal processing code applicable to a wide variety of applications