
This Year at SRC:
Dr. George is Right

Topics

- **Has the reconfigurable computing era passed?**
- **Brief overview of SRC's last years accomplishments**
- **Could HPC and HPEC really be one in the same?**



Topics

- **Has the reconfigurable computing era passed?**
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Popular Views: Reconfigurable Computing is Dead

- You don't see any articles in the popular press
- Look at how much we hear about multi-core
- University work has moved on to other things
- Companies are getting out of it
- Conclusion: Obviously it did not work

Reality:

Reconfigurable Computing is Very Alive

- Popular press always jumps on whatever is new often based on corporate promotion engines
- Yes multi-core is here and promoted by large companies as the future; But so was Itanium
- University work always follows the newest thing because that is where they can get money
- Too many companies jumped in incorrectly thinking they could sell a partial solution.
- System sales have moved from vocal lower revenue Universities to quiet higher revenue companies
- Conclusion: It does work and business is growing

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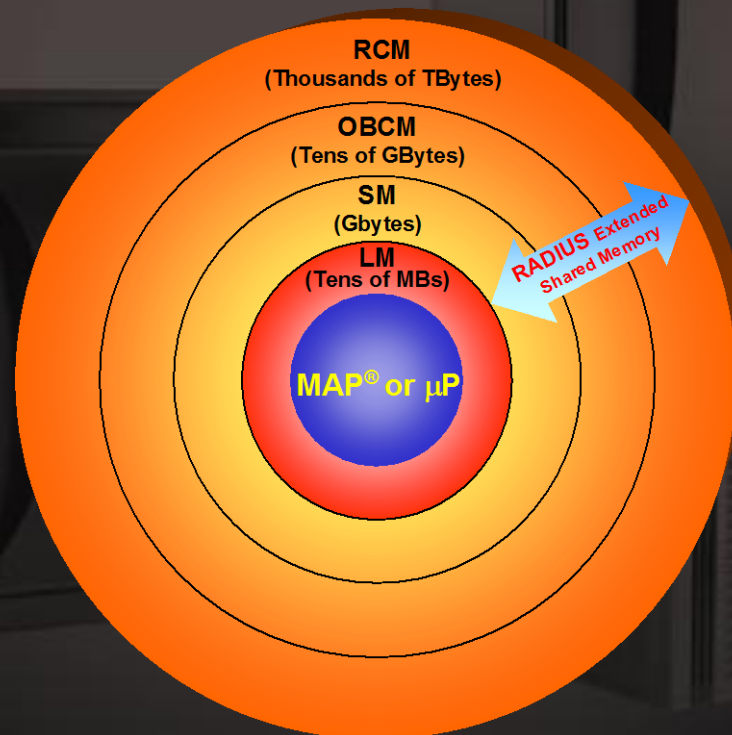
SRC-7 Product Line Expanded

- SRC-7 MAPstations, Hi-bar systems and Infiniband clusters are all shipping
- 8 MAP configurations available
- 2 versions of Carte now available
- Systems starting at \$17K



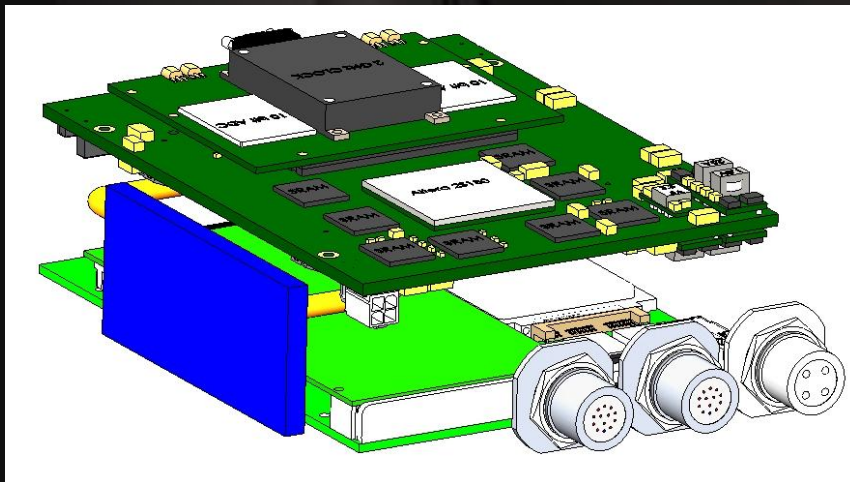
Radius Memory Hierarchy

- First system with 14 Tbytes delivered
- Programmer View
 - All memory accessed in a uniform manner
 - Any memory may be a target or source for block data transfer



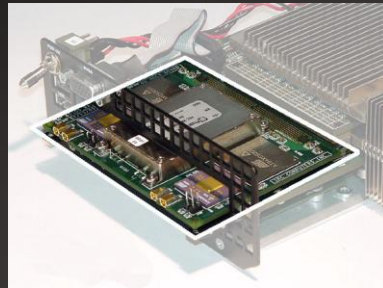
SRC-7 Portable System

- Currently in design
- Uses Series H MAP and Intel Atom processor
- 9.2" x 6.75" x 3.64"
- Lightweight (<6 lb.) and sealed Mil Spec versions
- <100 watts typical



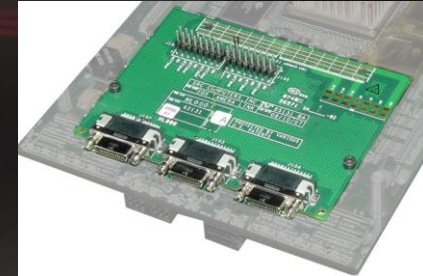
New GPIOX Cards

A/D



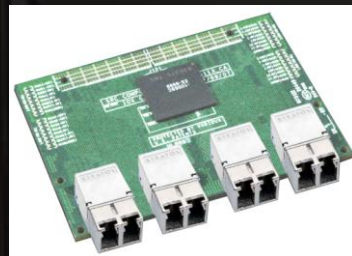
Dual 10 bit, 2 Gsample A/D with coherent clock source provides data for RADAR Backprojection directly to MAP

Cameralink



Full bandwidth cameralink interface provides data directly to MAP for biometrics, airborne identification and tracking applications

FPDP/
Ethernet PCS



Supports multi-box system interconnect direct to MAP

Other Possibilities:
Direct network connections
Fiberchannel interfaces
D/A conversion
Sensor connections

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Forward Looking Question

- 2002: Can you fit this system on a Predator?

*Jay Keyworth
Fmr. Dir. HP
Dir. General Atomics*



Forward Looking Answer

- 2002: Yes!



Maybe there's a better solution

The Winding Road

- 2003: SRC moves from single to multi-MAP systems

HPC



2003



HPEC



The Winding Road

- 2004: Air Force contract to shrink MAPstation to fit on mid-flier UAV and publishes results in 2005

HPC

HPEC

2003

2004



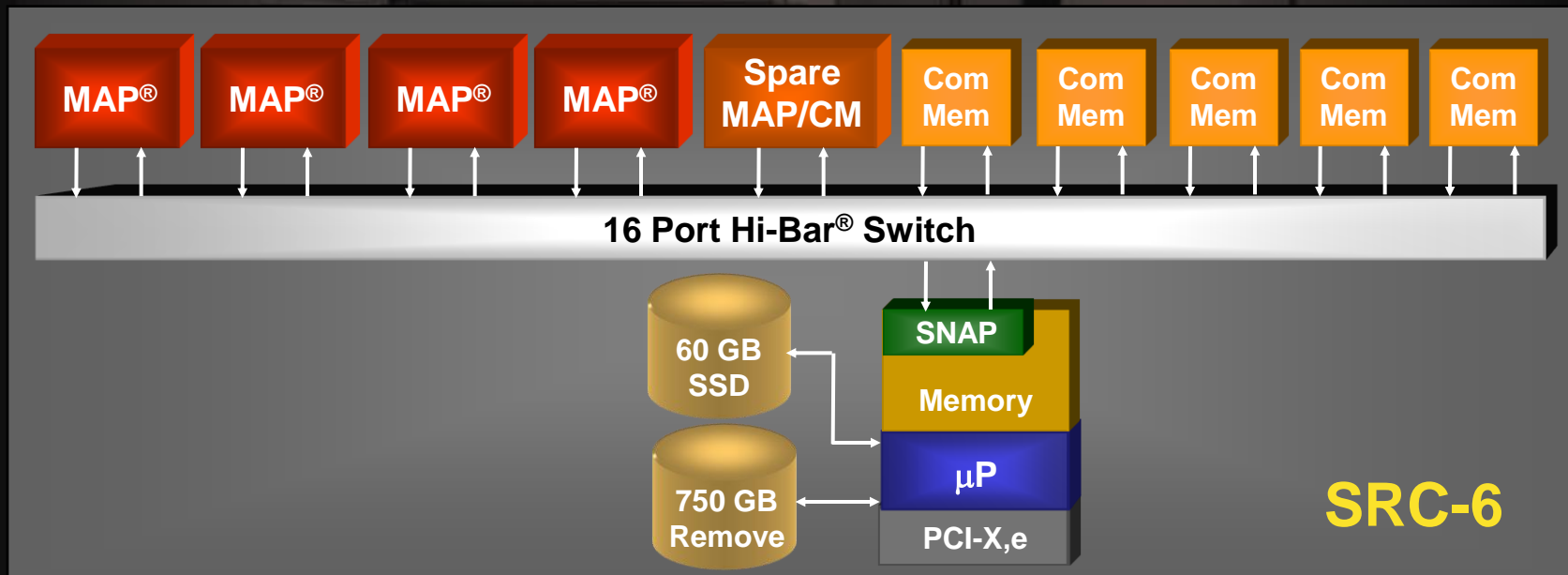
1 MAP
512 Mbytes CM
Intel M μ P
2" x 6" x 12"
100 Watt typical

7' wingspan UAV



The Winding Road: Anatomy of the TRACER Program SDP

- Customer sees Air Force results; asks for larger system using standard SRC modules for a general purpose processor
- First app is 250K lines of C++ code; floats, fixed and integers
- Multicore ineffective due to per processor data access requirements
- Multiple simultaneous processes on μ P need to access MAPs & CM
- Staff were programmers with no hardware skills



The Winding Road

- 2007: Army awards LMCO a contract to use expanded MAPstation on Sky Warrior version of Predator

HPC

HPEC

2003



2004



2007



2007



2007



4 MAPs
80 Gbytes CM
Dual socket Intel Xeon μ P
10.5" x 17" x 20"
600 Watt typical
Uses standard SRC modules

The Winding Road: TRACER SDP

- 3 programmers took 3 months to port application to system
- Used Carte™ with standard debuggers; No debugging on hardware!
- Performance shown to equal 100 1.5 GHz Power PCs
- SRC COTs hardware meets required airborne MIL specs
- 10.5" x 17" x 20" package weighing 85 pounds
- 600 watts



The Winding Road

- 2008: Oil company starts talks to use rugged system in the field
- LMC0 requests an an air cooled version for non-airborne use

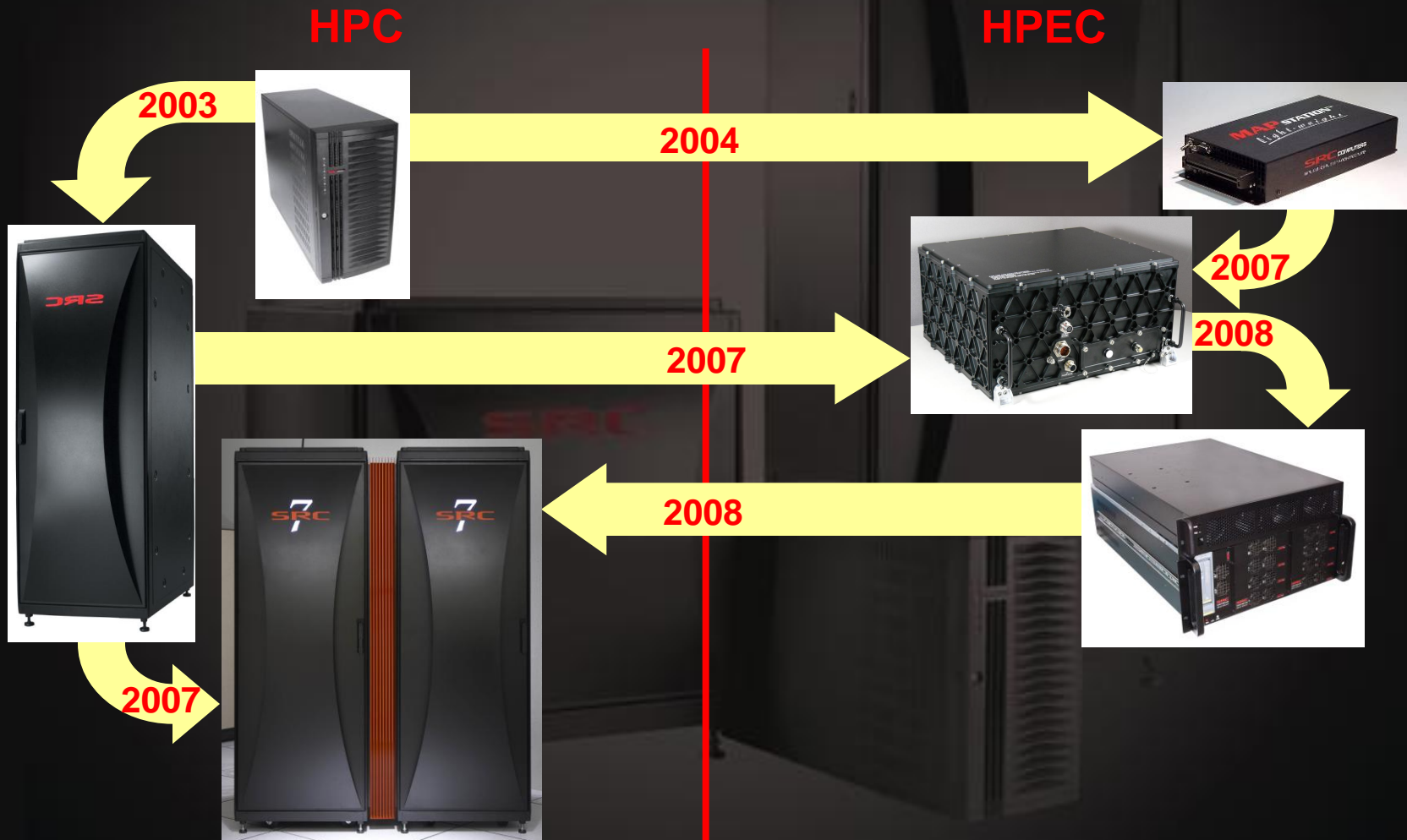
HPC

HPEC



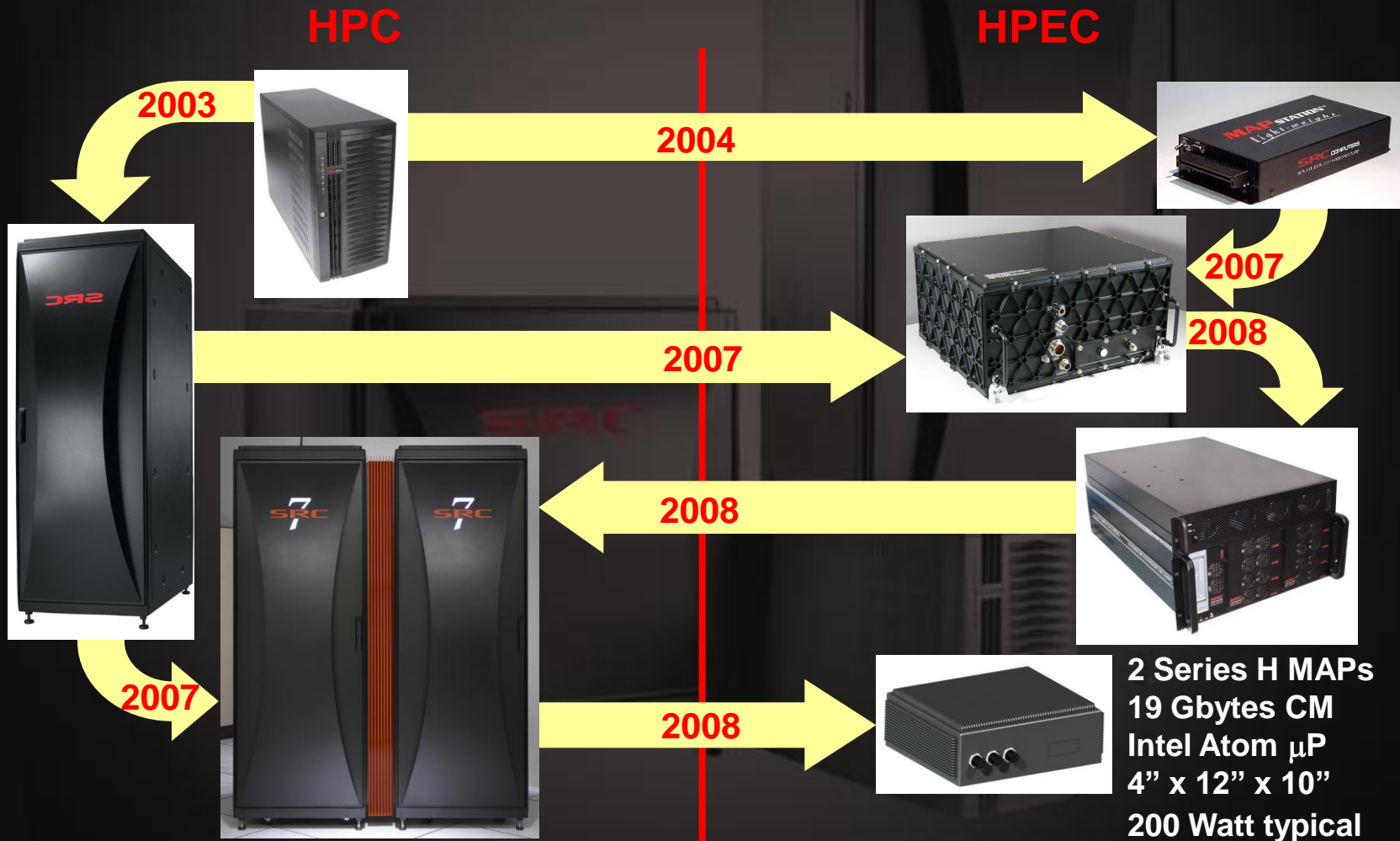
The Winding Road

- 2008: Oil company realizes it is a general purpose system and is now evaluating its use in their IT center



The Winding Road

- 2008: Major defense contractor requests a new rugged MAPstation be built from standard SRC-7 modules



Based on SRC's Experience

- **There is no real difference in HPC and HPEC**
 - Hardware is the same
 - Carte programming environment is the same
 - There are not significant differences in application constructs
 - The only real difference is that HPEC takes size, weight and power constraints much more seriously
- **Issues needing to be resolved to bring RC into both arenas are really the same**
 - We would advocate closer ties between communities
 - CHREC is a good but embedded is often viewed as inferior

Dr. George was right in 2007!