CCDSC'14 Panel

Exascale topic

Dr. Jean-Laurent PHILIPPE, PhD
Technical Sales Director, Western Europe
Intel Corp

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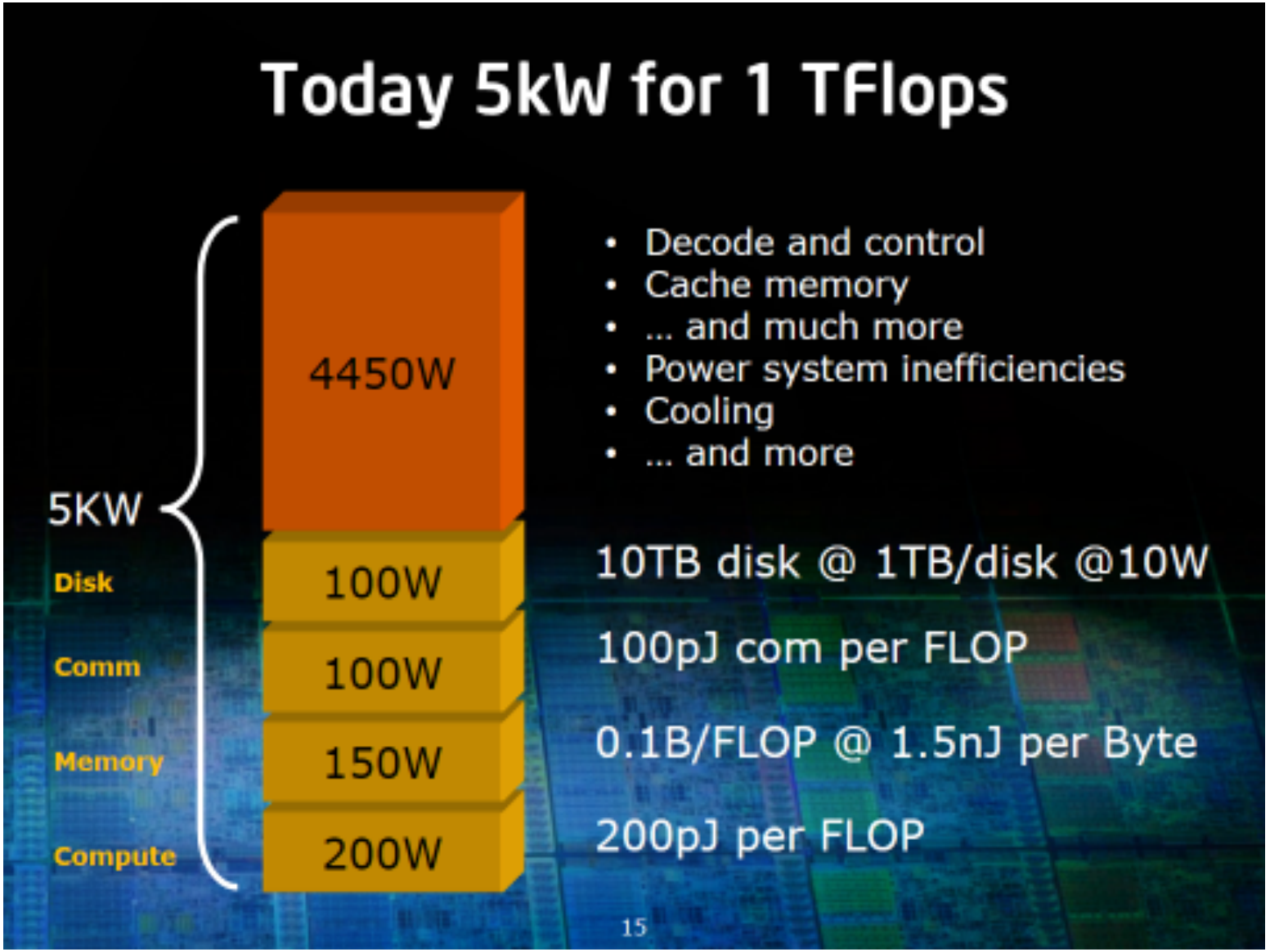
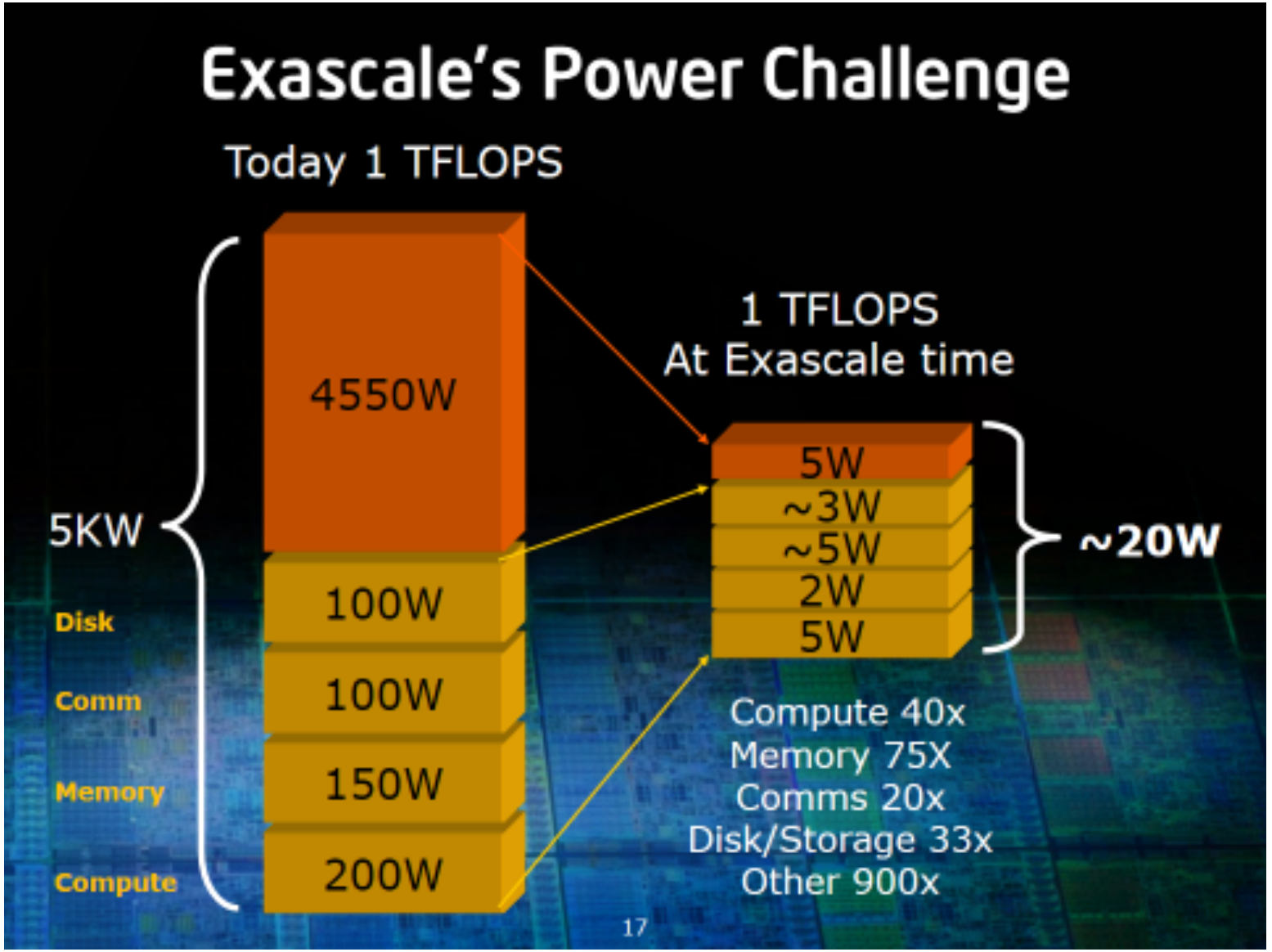
Problem statement (2011)



Problem statement (2011)



ExaFlops ???

1 EF (ExaFlops) = 10^{18} Flops

How can we achieve this?
It ***could*** take:

- A microarchitecture that does 10 ops/cycle — 10^1
- In a core running at 2GHz — $2\ 10^9$
- With 250 cores per socket — $2.5\ 10^2$
- On a 200,000 sockets — $2\ 10^5$

One among many solutions

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It ***could*** take:
- A microarchitecture that does 10 ops/cycle — 10^1
- In a core running at 2GHz — 2.10^9
- With 100 cores per socket — 10^2
- On a 500,000 sockets — 5.10^5

One among many solutions

ExaFlops ???

1 EF (ExaFlops) = 10^{18} Flops

How can we achieve this?
It ***could*** take:
- A microarchitecture that does 10 ops/cycle — 10^1
- In a core running at 1GHz — 10^9
- With 500 cores per socket — $5\ 10^2$
- On a 200,000 sockets — $2\ 10^5$

One among many solutions

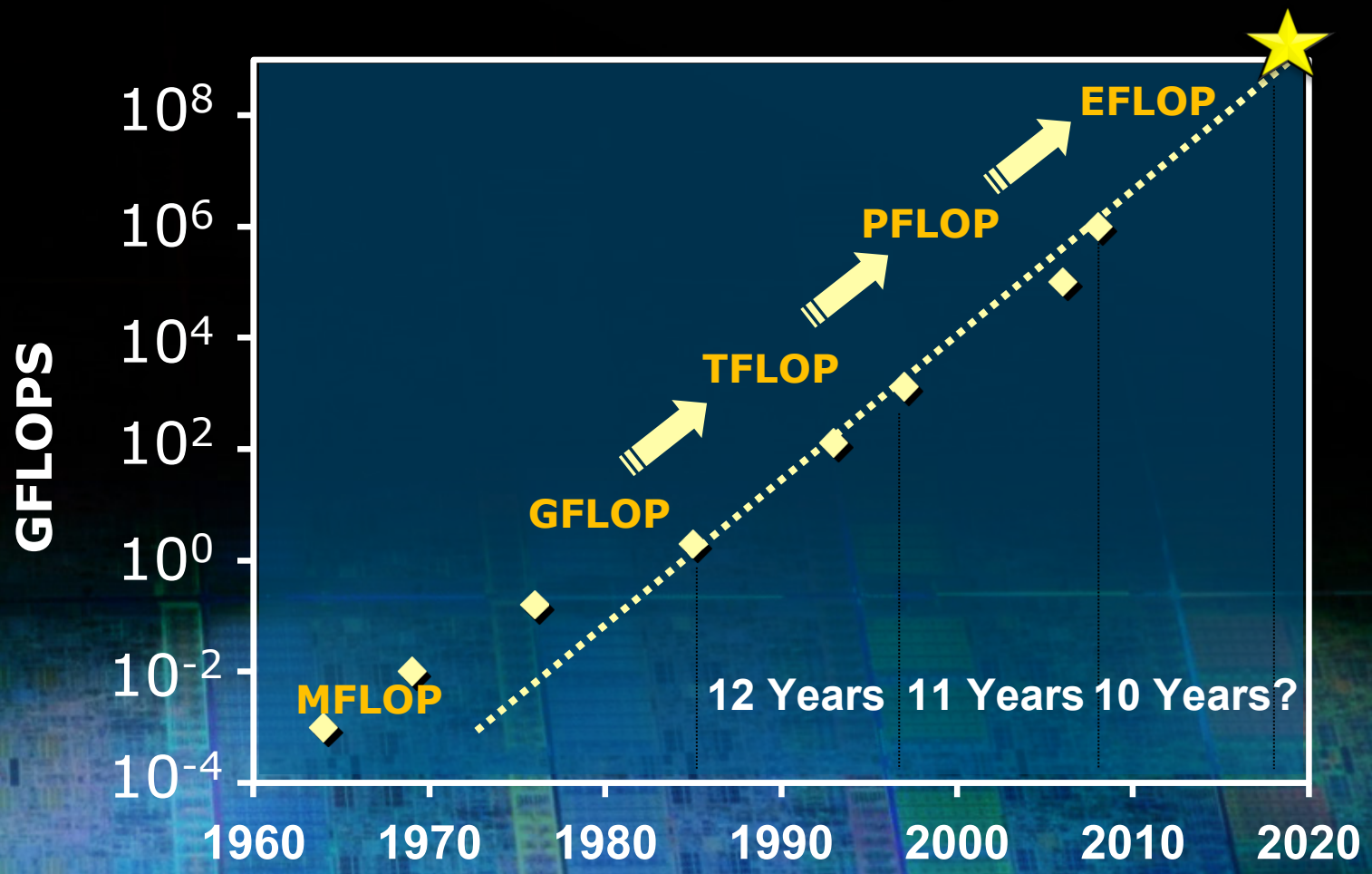
ExaFlops ???

1 EF (ExaFlops) = 10^{18} Flops

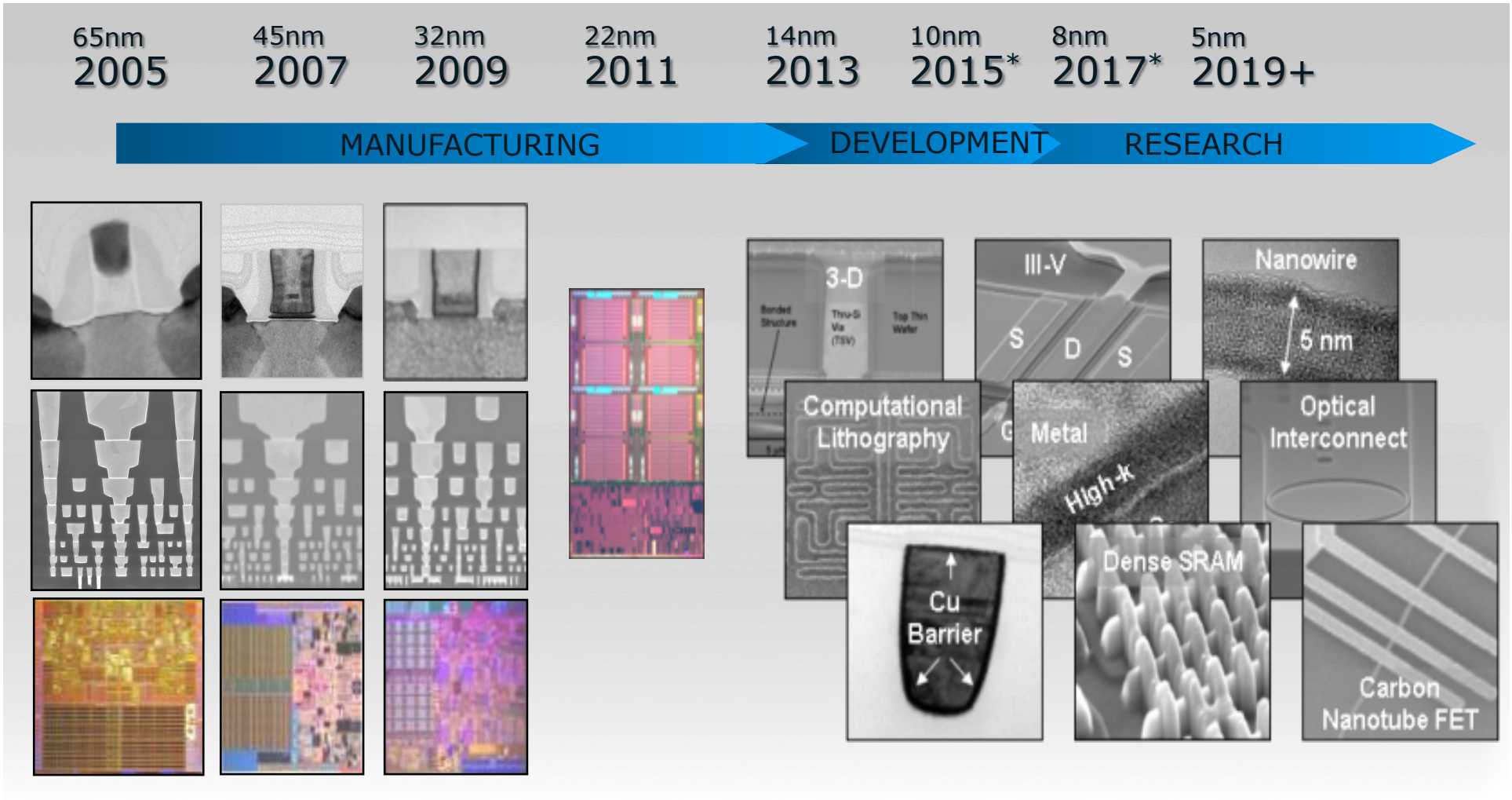
How can we achieve this?
It ***could*** take:
- A microarchitecture that does 10 ops/cycle 10^{1}
- In a core running at 1GHz 10^{9}
- With 1,000 cores per socket 10^{3}
- On a 100,000 sockets 10^{5}

One among many solutions

Today's Exascale Expectation



Moore's Law



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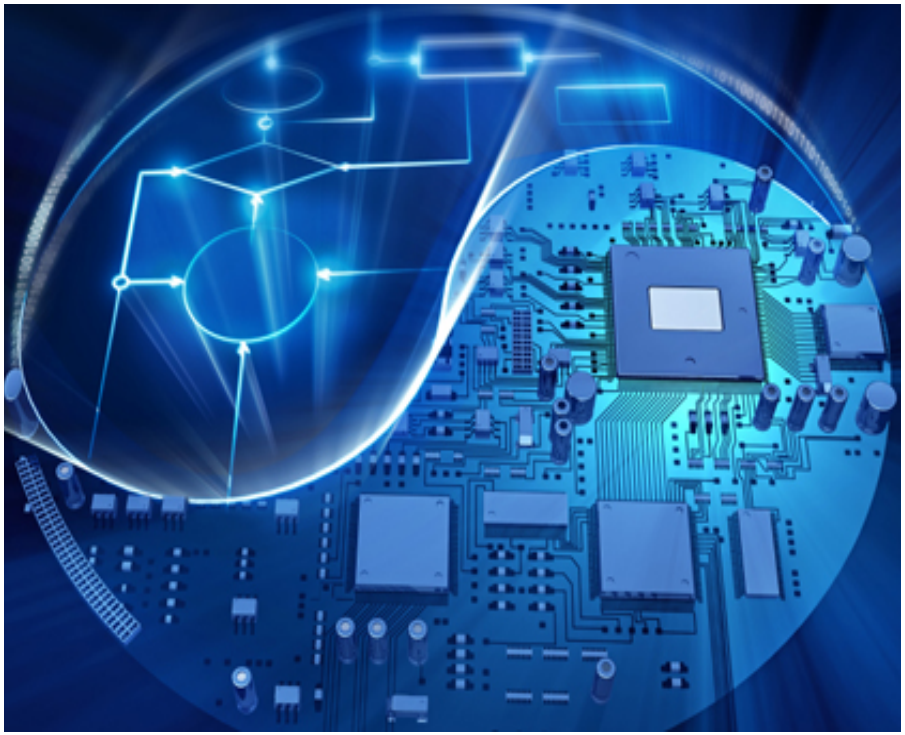
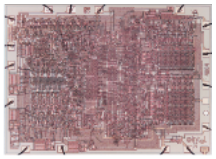
Moore's Law - 22nm Tri-Gate



3rd Generation Intel® Core™ Processor Family
(2012, codename IvyBridge)

vs.

4004
(1971)

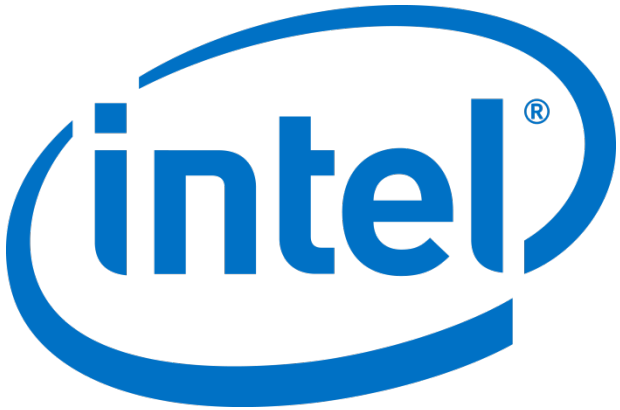


4,000X Faster

5,000X Less Energy / Transistor

50,000X Cheaper / Transistor

Source: Intel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