

Lecture 3: More technology

Wednesday, January 9, 2019 6:40 PM

Outline

- Energy and power of CMOS devices
- Trends in technology
- Start on ISA/instructions, if time

IF A RESEARCHER SAYS A COOL
NEW TECHNOLOGY SHOULD BE
AVAILABLE TO CONSUMERS IN...

WHAT THEY MEAN IS...

THE FOURTH QUARTER OF NEXT YEAR	THE PROJECT WILL BE CANCELED IN SIX MONTHS.
FIVE YEARS	I'VE SOLVED THE INTERESTING RESEARCH PROBLEMS. THE REST IS JUST BUSINESS, WHICH IS EASY, RIGHT?
TEN YEARS	WE HAVEN'T FINISHED INVENTING IT YET, BUT WHEN WE DO, IT'LL BE AWESOME.
25+ YEARS	IT HAS NOT BEEN CONCLUSIVELY PROVEN IMPOSSIBLE.
WE'RE NOT REALLY LOOKING AT MARKET APPLICATIONS RIGHT NOW.	I LIKE BEING THE ONLY ONE WITH A HOVERCAR.

Energy and Power of CMOS devices

How do energy and power relate?

Energy =

Static energy:

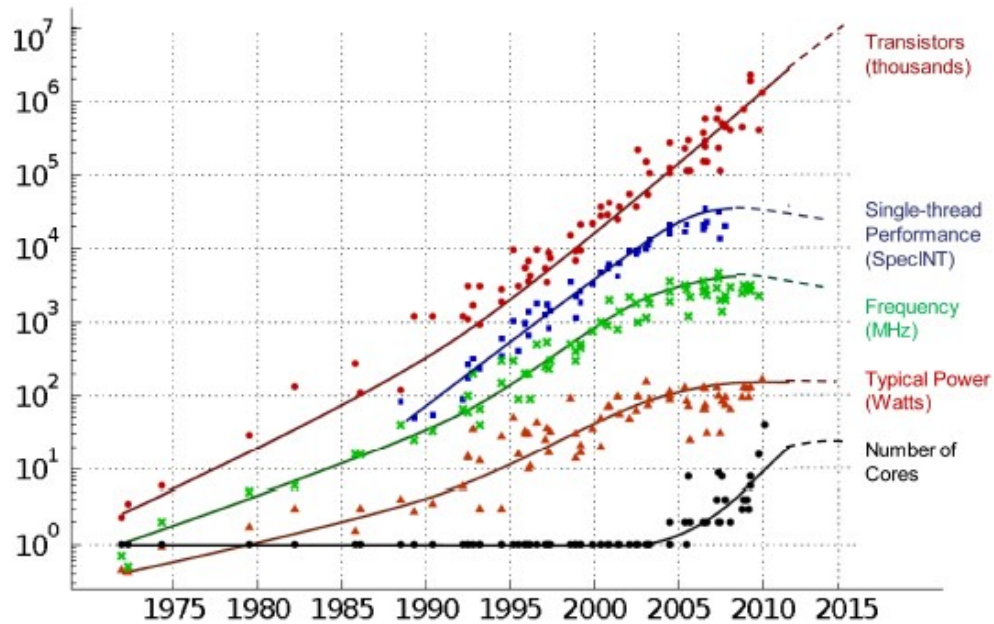
Dynamic energy:

Power:

If we are power/energy constrained: How do we reduce power/energy?

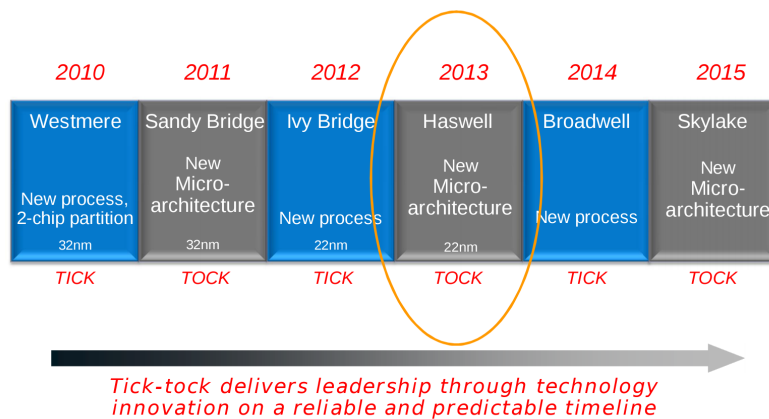
Trends

35 Years of Microprocessor Trend Data



Slides from Intel

Intel Tick-Tock Model

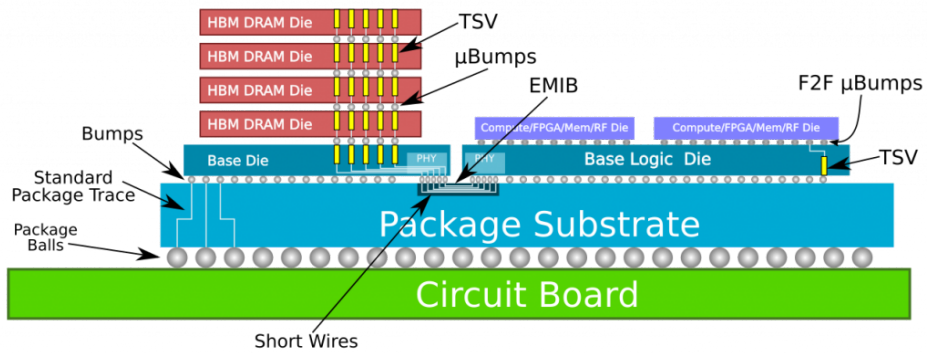
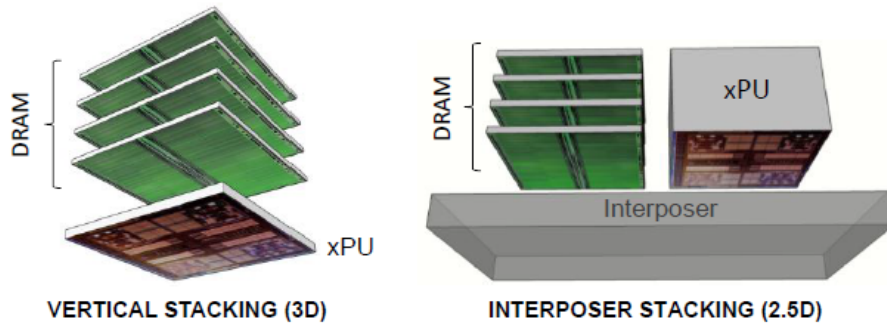


Other trends

DIE STACKING IS IDEAL FOR INTEGRATION



- All they do is reduce metal interconnect by improving proximity of disparate technologies



[John Hennessy and David Patterson 2017 ACM A.M. Turing Award Lecture](#)

