

The Power of Openness

by Andreas Olofsson



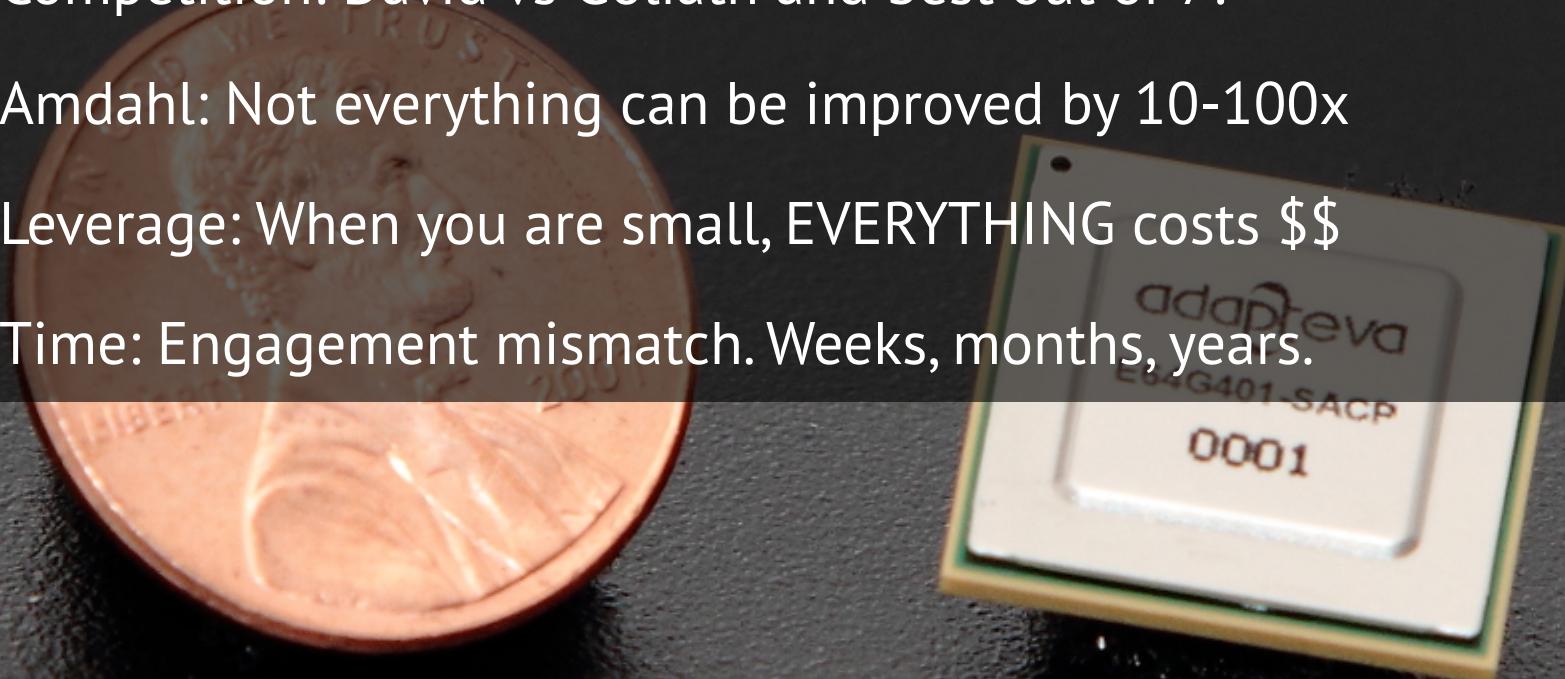
Adapteva History

- 2008: Semiconductor company founded in Lexington, MA
- 2010: 16-core 65nm processor (25GFLOPS/W)
- 2011: 64-core 28nm processor (50GFLOPS/W)
- Accomplished with 3 engineers and \$5M

But it wasn't enough!

Startup Challenges

- Skepticism: "If it was possible, Intel would have done it"
- Competition: David vs Goliath and best out of 7!
- Amdahl: Not everything can be improved by 10-100x
- Leverage: When you are small, EVERYTHING costs \$\$
- Time: Engagement mismatch. Weeks, months, years.



\$2B+ of parallel architecture R&D

Achronix Brightscale Cradle Mathstar Sandbridge

Adapteva Calxeda C-Switch Mobileye Silicon Sp.

Ambric Chameleon ElementCXI Monarch Stream Proc

Asocs Clearspeed Greenarrays Octasic Stretch

Aspex Cognivue Icera Picochip Tilera

Axis Semi Coherent L. Intellasys Plurality Transputer

BOPS CELL IP-flex PACT XMOS

Boston C. CPU Tech Larrabee Quicksilver Zilabs

My 2012 "Epiphany"

1. Pricing and paranoia was killing us!
2. Openness is the "secret" to building platforms
3. Follow the leaders:
 - Arduino & Raspberry Pi --> low price breeds adoption
 - Kickstarter --> capital transparency
 - Linux --> open collaboration leadership
 - ARM --> importance of strong corporate partners

Kickstarting Parallel Computing

- Parallella: "The \$99 supercomputer"
- 18 CPU cores on a credit card and @ 5W
- Democratizes access to parallel computing
- \$898K raised on Kickstarter in Oct 2012
- Open source and open access
- Now generally available at Amazon & Digi-Key

Openness: Before & After

Metric	Before	After	Boost
Customers	5	10,000	2000x
Universities	1	200	200x
Site traffic	20	1,000	50x
Twitter Followers	20	1,000	50x
Publications	2	30*	15x
Govt customers	2	10	5x
Yearly Sales	\$45K	\$1.8M	40x

Hurdles to Make Adoption

Skill & Interest	Rock Star	Researcher	Maker	Consumer
Board design	Yes	No	No	No
Software plumbing	Yes	No	No	No
System administration	Yes	No	Yes	No
Soldering, assembly	Yes	No	Yes	No
Building application	Yes	Yes	Yes	No
RTFM	Yes	Yes	Yes	?
Total Reach	10	10K	10M	1B

Challenges remaining

- Parallel programming productivity
- Status Quo Resistance
- US manufacturing costs

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"The Whole 'Parallel Computing Is The Future' Is A Bunch Of Crock." --Linus Torvald

Conclusions

- Adapteva prospering with unprecedented transparency
- Openness is fundamental to modern collaboration
- "Linux like" movement is happening in hardware

“ *"There is plenty of room at the bottom"* --Richard Feynman