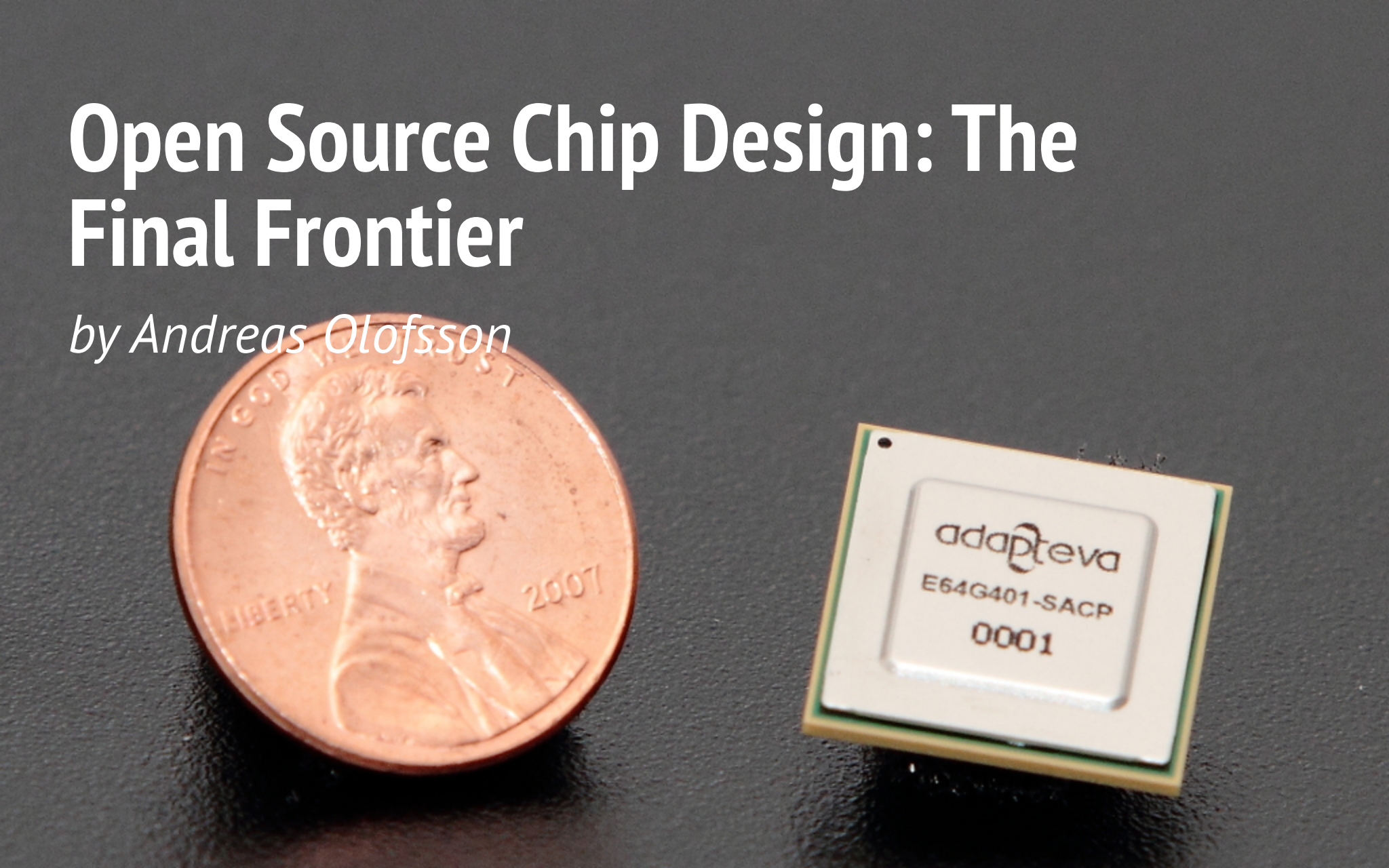
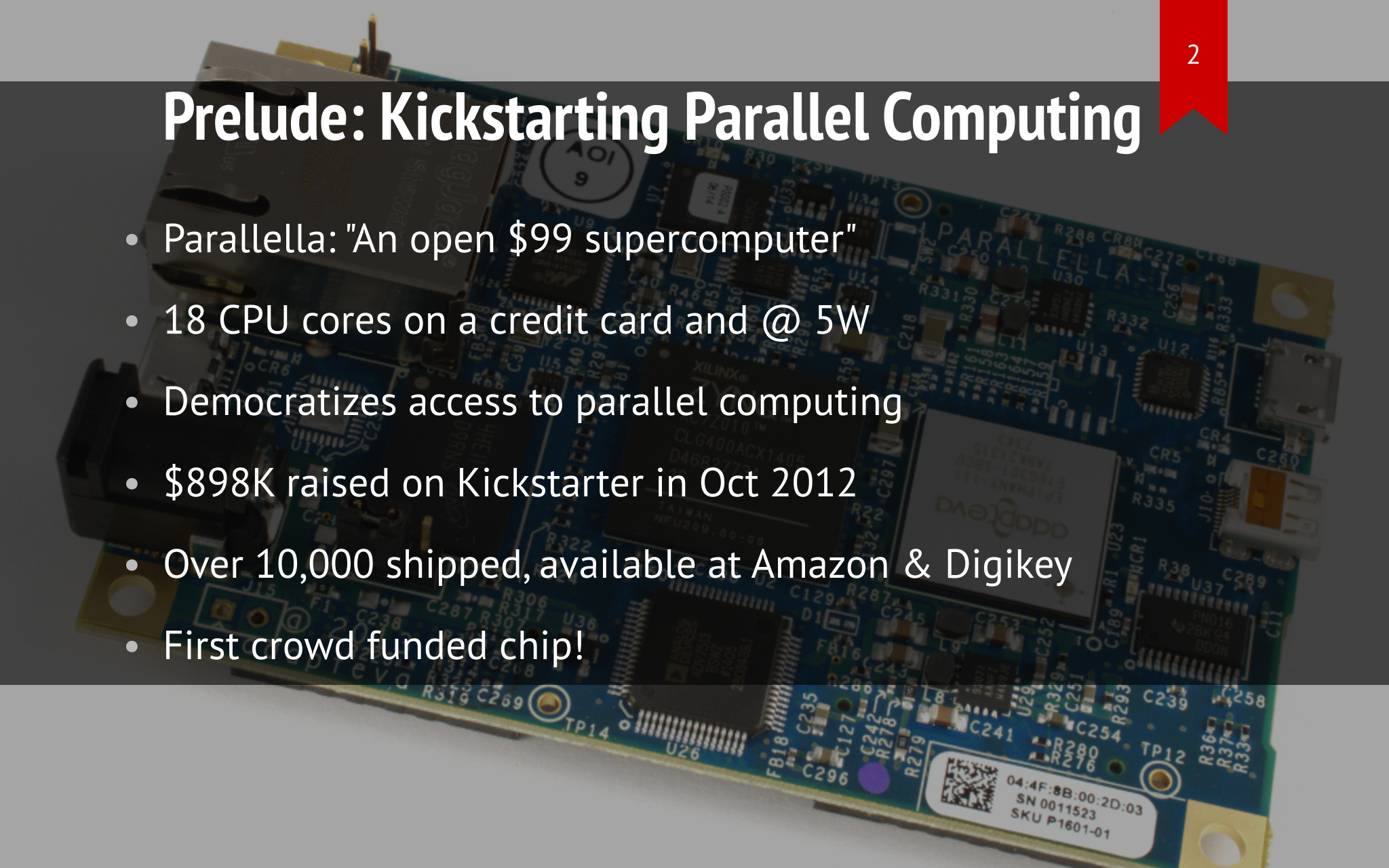
Open Source Chip Design: The Final Frontier

by Andreas Olofsson



Prelude: Kickstarting Parallel Computing



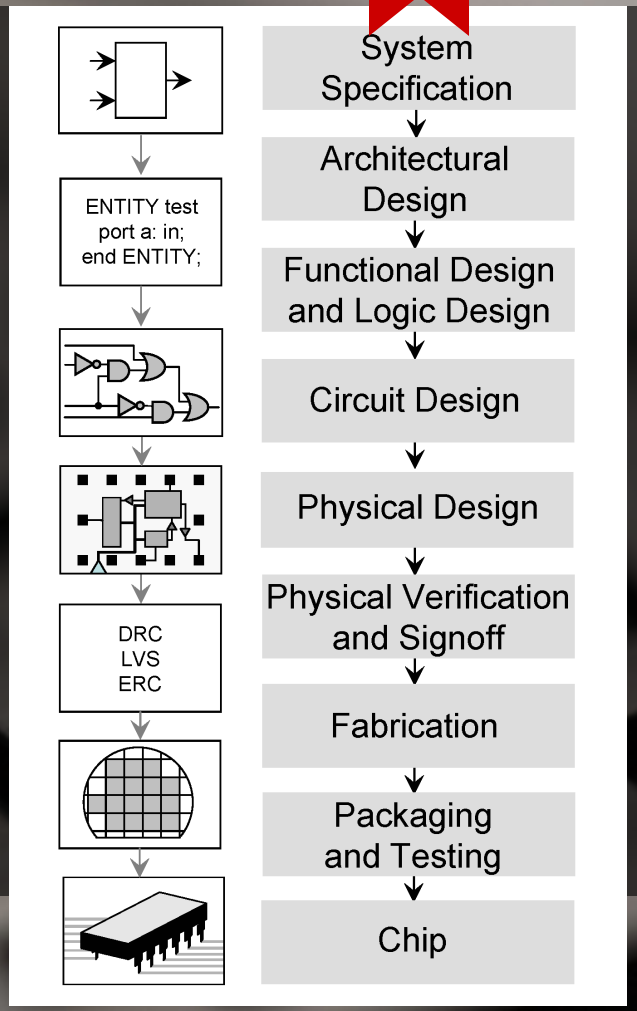
- Parallella: "An open $99 supercomputer"
- 18 CPU cores on a credit card and @ 5W
- Democratizes access to parallel computing
- $898K raised on Kickstarter in Oct 2012
- Over 10,000 shipped, available at Amazon & Digikey
- First crowd funded chip!

Openness Works!

Metric	Before	After	Boost
Site traffic	20	1,000	50x
Twitter Followers	200	6,000	30x
Universities	1	200	200x
Publications	2	30	15x
Customers	5	10,000	2000x
Yearly Sales	$45K	$1.8M	40x

Chip Design 101

- ~1 cent / million logic gates
- Arcane languages (Verilog / VHDL)
- 1 year compilation cycle
- $1M / compiler seat
- $1M / hardware bug
- Completely opaque and proprietary flow



Status Quo Chip Design Costs

> *"System On Chips cost $100M to develop" --industry pundit*

Engineering	$150K/eng * 100(0)
IP Licensing	$1-10M
EDA Tools (Compilers)	$1-10M
Tapeout (Tooling)	$5M
Chip packaging	$50K
Qualification	$1M


What if chip design
was FREE?

The long tail of electronics

> *"Axiom: Big semiconductor companies only cares about big $$"*

...but what about low volume designs (1-100K units)?

- Health (diagnostics, embedded)
- Robotics (smarter, smaller)
- Communication (free and pervasive)
- Special supercomputers (to answer really tough questions)

FREE Chip Design Grande Challenges

Challenge	Industry	Hurdle	Current	Future
Open source chip IP	$5B	NIH	$1M+	$0
Open source EDA	$6B	Complexity	$1M+	$0
Engineering	--	Time	9 months	24hrs
Packaging	$13B	Logistics	$50K	$0
Manufacturing	$40B	Logistics	$2M+	$1,000*

Conclusion

1. Electronics improvements leads to society improvements
2. Extending Moore's Law is a moral imperative!
3. With process scaling ending, FREE chip design needed to extend Moore's Law