HiFive Unleashed: World’s First Multi-Core RISC-V Linux Development Board

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How did Instagram turn into a $1B acquisition with only 13 employees?*

Have you ever heard of a $1B hardware company with 13 employees?
Tech Stack

Open-Source Technology

- Python
- React
- NGINX
- Django
- Solr
- RISC-V
- Gunicorn
- Gearman
- PostgreSQL
- Redis
- Ubuntu
- NVIDIA
- NVDLA

from techstacks.io

Infrastructure

- Amazon Web Services™
- Amazon CloudFront
- ROUTE 53
- SiFive silicon cloud services
SiFive Silicon Cloud Services

SiFive SCS
(CPU Soft IPs, Subsystem Soft IPs, Prototype ASICs, Production ASICs)

Low-power, 32-bit microcontrollers
- TSMC 180nm
- Digital and Analog peripherals
- Edge Computing (AI), Embedded, Smart IOT, Wearables

High-performance, 64-bit multi-core chips
- TSMC 28nm
- Cache coherent accelerator support
- High speed peripherals: PCIe Gen3, GbE, DDR3/4
- Datacenter Accelerators, Storage, SSD Controllers, Networking, Baseband

3rd-Party DesignShare IP + Customer IP

Open-Source IP

=
• 320+ MHz SiFive E31 CPU
  • 16KB L1I$, 16KB Data Scratchpad
  • Hardware Multiply/Divide, Debug Module
• Multiple Power Domains
• Low-Power Standby
• Wide Range of Clock Inputs

Freedom E310, QFN48, manufactured in TSMC 180nm
HiFive1: Arduino-Compatible RISC-V Dev Board

- SiFive FE310-G000 (built in 180nm)
- Operating Voltage: 3.3 V and 1.8 V
- Input Voltage: 5 V USB or 7-12 VDC Jack
- IO Voltages: Both 3.3 V or 5 V supported
- Digital I/O Pins: 19
- PWM Pins: 9
- SPI Controllers/HW CS Pins: 1/3
- External Interrupt Pins: 19
- External Wakeup Pins: 1
- Flash Memory: 16 MB Quad SPI
- Host Interface (microUSB): Program, Debug, and Serial Communication

Order now at crowdsupply.com for $59
• 1.5+ GHz U54-MC SiFive CPU
  • 1x E51: 16KB L1I$, 8KB DTIM with ECC support
  • 4x U54: 32KB L1I$, 32KB L1D$ with ECC support
  • Single- and Double-precision floating-point support
  • 2MB Banked L2$ with directory-based cache-coherence & ECC support
• ChipLink
  • Serialized Chip-to-Chip Coherent TileLink Interconnect
• DDR3/4, GbE, Peripherals

Freedom U540, FCBGA, manufactured in TSMC 28nm
HiFive Unleashed: World’s First Multi-Core RISC-V Linux Dev Board

- SiFive FU540-C000 (built in 28nm)
- 8 GB 64-bit DDR4 with ECC
- Gigabit Ethernet Port
- 32 MB Quad SPI Flash
- MicroSD card for removable storage
- MicroUSB for debug and serial communication
- Digital GPIO pins
- FMC connector for future expansion with add-in cards

Early access order for March & late June order sold out, 24 HiFive Unleashed bundles left at crowdsupply.com
FU540 Preliminary SPECINT2006 Comparison

- U54@1.5GHz, SiFive FU540-C000, HiFive Unleashed
- A53@1.2GHz, Allwinner R18, Pine A64 LTS
- A53@1.5GHz, RockChip OP1/RK3399, Samsung Chromebook Plus

Work in progress
Open-V: SiFive / ONCHIP Microcontroller based on Freedom Everywhere

- Based on open-source Freedom Everywhere platform
- 3.3mm x 2.6mm TSMC 180nm
- 2.7M transistors
- Collaboration between SiFive and ONCHIP Integrated Systems Research Group in Columbia
- SiFive provided E31 Core Complex and prototyping service
- ONCHIP provided >10 TSMC 180nm Analog IP
Democratizing Ideas: Submit Proposal for Your Own Freedom Chip!


- Do you have a great idea for a chip? Do you have an IP block, such as an accelerator, a co-processor?
- We are considering projects for SiFive partnership which could involve access to custom CPU IP, design support, and even help delivering working samples of your chip!
- Partners to be announced at First Annual RISC-V Summit, to be held Dec 3-5, 2018
Join the RISC-V Revolution!

• HiFive Unleashed is an important milestone for RISC-V development
  • Important for software ecosystem development, education, and hardware prototyping
  • Help push the price down of next development board as much as possible

• For researchers and entrepreneurs
  • RISC-V is completing the innovation cycle of Research, Education, and Industry
  • You can afford a custom chip just for your application
  • Start customizing the SiFive Freedom platform
  • Innovate at both the hardware and software level

• Submit your proposal for your own Freedom chip today, let’s make it happen together

• Start today at https://sifive.com